

Effectiveness of Behavioral Economics-Informed Strategies and
Enhanced Food Preparation Skills to Increase Vegetable Intake and
Variety of Vegetables Eaten among Low-Income Children

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Dedication

I dedicate this dissertation to my two daughters Willow and Wynn timer, and my mom, Florita Mangundayao. I hope to be an inspiration to my daughters as you have been to me.

Abstract

Obesity prevalence among children continues to be a serious problem, especially for those in low-income households. Inadequate vegetable intake leading to low dietary quality may be a contributing factor to the obesity problem among children. The field of behavioral economics has gained momentum in nutrition interventions for improving vegetable intake, mainly in school and other cafeteria settings, using low-to-no cost modifications to the food environment. Similar strategies have yet to be tested in the home in a large-scale trial. The overall objective of the following dissertation was to determine if an intervention comprised of 6 behavioral economics-informed strategies within a 6-session vegetable-focused cooking skills program, grounded in Social Cognitive Theory, was more effective for improving vegetable intake, vegetable liking, variety of vegetable eaten, BMI-z score, and home availability of vegetables for a diverse sample of low-income children (ages 9-12) than a control condition of the vegetable-focused cooking skills program alone. The 6 strategies tested were: 1) child helping to prepare the vegetables, 2) using a plate that shows the appropriate proportion of food groups within a meal, 3) making the vegetables the most available and visible part of the meal, 4) serving at least 2 vegetables with the meal, 5) serving the vegetables before the meal, and 6) using a bigger spoon to serve the vegetables. The three separate reports included in this dissertation utilized data collected in a longitudinal controlled intervention trial conducted in the Minneapolis-St. Paul metropolitan area from September 2014-June 2017. Outcome measures were collected at 4 time points: baseline, immediate post-course, 6-months post-course, and 12-months post-course.

Mixed model regression analyses and t-tests were used to compare outcomes between intervention and control groups. A total of 103 parent/child pairs were enrolled with 91 who

completed the weekly cooking skills program. The child outcomes of vegetable intake, vegetable liking, variety of vegetables eaten, and BMI-z score, as well as home availability of vegetables were not improved for the intervention children more than the control children.

The immediate impact of the vegetable-focused cooking skills program on parent and child psychosocial measures (e.g. cooking self-efficacy and interest in cooking) was assessed. Baseline and immediate post-course survey data from the intervention and control groups were combined since both groups participated in the cooking skills program. The combined data were used to assess changes in outcome measures from pre- to post-course. Validated parent self-report questionnaires were used to assess changes in the following psychosocial outcomes: cooking confidence, healthy food preparation, cooking barriers, and food resource management. Parents and children were asked if they had ever tried each of 37 different vegetables and if yes, to rate their liking. Changes between pre- and post-course responses were tested using paired t-tests or Wilcoxon signed-rank tests. Improvements were observed for parental cooking confidence, healthy food preparation skills, number of vegetables present in the home, parental vegetable liking, parental variety of vegetables eaten, and confidence in cooking individual vegetables and using several vegetable cooking methods. Improvements were also observed for child cooking self-efficacy and variety of vegetables eaten.

Vegetable liking and acceptability for a wide variety of vegetables was measured among a racially and ethnically diverse sample of 9-12 year old children. Child liking data were combined from the present study and another in-home intervention study with a similar study population. Mean liking ratings for each vegetable were calculated. The number of children that found each vegetable acceptable and unacceptable was also tabulated. The most liked vegetables were corn, potatoes, lettuce, and carrots. Artichoke, onion, and beets were the 3 vegetables with the lowest mean liking. Overall, children found a wide variety of vegetables acceptable.

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Introduction

This dissertation is the culmination of 3 years of data collection for a controlled-intervention trial that tested an intervention grounded in behavioral economics and Social Cognitive Theory (SCT), to increase vegetable intake among a racially and ethnically diverse group of low-income 9-12 year old children. An overview of each chapter is presented below.

The first chapter presents relevant literature pertaining to three separate reports presented in later chapters. Interventions that increase vegetable intake among children leverage the potential obesity-preventative effects of vegetables (Pérez-Escamilla et al., 2012; Sabaté & Wien, 2010). Children residing in low-income and/or food insecure households have shown lower diet quality (Hiza, Casavale, Guenther, & Davis, 2013; Kirkpatrick, Dodd, Reedy, & Krebs-Smith, 2012) and are at greater risk for obesity (Singh, Siahpush, & Kogan, 2010), compared to those in higher income and food secure households. As a result, they are often the priority populations for these interventions. The well-received notion of applying behavioral insights to interventions to increase vegetable intake (Thomson & Ravia, 2011; Wadhera, Capaldi Phillips, & Wilkie, 2015) has driven nutrition education research towards the field of behavioral economics (J. Guthrie, 2017). This field takes into account the cognitive biases that can lead people towards less optimal dietary choices (e.g. hunger, convenience leading to energy-dense options) (Samson & Gigerenzer, 2016) and suggests that small changes to the surrounding environment can ‘nudge’ people towards better choices (Thaler, Sunstein, & Balz, 2010). The first chapter concludes with the research objectives and hypotheses of the three separate studies that comprise this dissertation.

The second chapter presents the main trial in its entirety, inclusive of background, methodology, results and discussion sections. Using a controlled-intervention trial set within low-income communities, the effectiveness of an intervention was tested based on 6 strategies,

informed by behavioral economics that parents were expected to implement in their homes. The intervention was designed to improve children's vegetable intake and other related outcomes. The strategies were introduced and practiced within a vegetable focused cooking skills program where parents and children learned to cook together. The cooking skills program alone served as the control condition.

The third chapter examines the immediate impact of the parent-child cooking skills program for parent and child participants in both the intervention and control groups. Cooking skills programs are increasing in popularity to improve the frequency of meals prepared at home which may be of higher diet quality compared to those prepared outside the home (Ayala et al., 2008; Kant & Graubard, 2004; Lachat et al., 2012; McLaughlin, Tarasuk, & Kreiger, 2003; Todd, Mancino, & Lin, 2010). The study used pre- and post- course data from the control and intervention groups combined because both groups participated in the same vegetable-focused Cooking Matters for Families curriculum. The outcomes of interest were cooking confidence/self-efficacy, food resource management, liking and variety of vegetables eaten, and home availability of vegetables.

The fourth chapter presents the final study that measured liking and acceptability by children for a wide range of vegetables. The results provided individual liking ratings and acceptability on a wider variety of vegetables than in previous studies and for a racially and ethnically diverse sample of children.

The final two chapters are perspectives gained and potential future directions to consider, followed by a comprehensive list of references. The appendices include all study documents (e.g. survey measurement tools and study procedures for each session of the cooking skills course used to deliver the main intervention based on behavioral economics-informed strategies).

Chapter 1: Literature Review

1.1 Obesity prevalence among youth

Approximately 17% of all children and adolescents in the United States are obese with certain demographic subgroups more obese than others (Ogden et al., 2016). Ogden et al. (2016) examined National Health and Nutrition Examination Survey (NHANES) data from 1988 – 2014 and found obesity trends varied by age, with older adolescent age groups (ages 12 -19) showing the most persistent upward trend compared to younger age groups. Extreme obesity (BMI at or above 120% of the CDC’s sex-specific 95th percentile) increased across ages 6-19. The odds of obesity were higher among non-Hispanic black and Hispanic children and adolescents compared to non-Hispanic white children and adolescents. Skinner and Skelton’s (2014) analysis of NHANES data from 1999-2014 indicated strong, statistically significant increases in all classes¹ of obesity across all age groups. Sex- and age-specific categories based on CDC growth charts were used to conclude that all classes of obesity have increased over time for both male and female adolescents, but older youth (ages 12-19) had greater obesity prevalence (20.9%) compared to 6-11 year olds (17.9%) and 2-5 year olds (9.2%). From 2003 - 2007, obesity prevalence increased by 10% for all U.S. children but increased by 23%–33% for children in low-education, low-income, and high-unemployment households (Singh, Siahpush, & Kogan, 2010).

1.2 Obesity and diet quality among low-income and food insecure households

An analysis of NHANES data from 2001-2010 showed that food insecurity is associated with an increased risk of obesity in children ages 6-11, compared to children of the same age residing in food secure households (Kaur, Lamb, & Ogden, 2015). Children may be vulnerable to this “paradoxical” effect between food insecurity and obesity (Gundersen & Kreider, 2009).

1. Overweight $\geq 85^{\text{th}}$ percentile; Class I Obesity $\geq 95^{\text{th}}$ percentile; Class II Obesity $\geq 120\%$ of the 95th percentile OR BMI ≥ 35 and; Class III Obesity $\geq 140\%$ of the 95th percentile or BMI ≥ 40

Following the parameters of the feast-famine cycle, such eating patterns result in increased body fat coupled with decreased lean body mass due to repartitioning of energy to fat stores instead of lean muscle tissue (Dietz, 1995). The Supplemental Nutrition Assistance Program (SNAP) serves only low-income households. Adult participants reported higher body mass indices (BMI) and were more likely than other adults (non-participating low-income and higher income adults) to be overweight or obese (Mancino & Guthrie, 2014). They also reported greater weight gain over the past year and were more likely to report having had heart disease, a stroke, or diabetes, compared to higher income respondents. The view that social class inequities in dietary health may stem from the prohibitive cost of healthy eating is supported by an abundance of empirical data (Darmon & Drewnowski, 2008).

1.3 Vegetable intake

Vegetable intake and health

The well-documented health benefits of vegetables span across chronic disease epidemiology to human nutrition. Epidemiological studies and meta-analyses have suggested an inverse association between vegetable intake and incidence of chronic diseases and morbidities including cardiovascular disease (Bazzano, Serdula, & Liu, 2003; Oyebode, Gordon-Dseagu, Walker, & Mindell, 2014), type 2 diabetes (Boeing et al., 2012; Villegas et al., 2008), stroke (Boeing et al., 2012; Hu, Huang, Wang, Zhang, & Qu, 2014), cognitive decline (Loef & Walach, 2012), and some cancers, although this evidence is less certain (Aune et al., 2012; Bosetti et al., 2012; Luo et al., 2015). Vegetables are generally low in both energy density and saturated fat, are micronutrient-rich, have antioxidant activity, and enhance insulin sensitivity effects (Slavin and Lloyd 2012; Hornick and Weiss 2011; Zino et al. 1997; Van Duyn and Pivonka 2000). Most vegetables are high in dietary fiber which induces periods of satiety (Slavin & Lloyd, 2012). High vegetable intake can displace high-energy dense foods, leading to reduced obesogenic effects

through a reduction in daily kilocalories. This displacement could ultimately result in reduced BMI and adiposity levels (Pérez-Escamilla et al., 2012; Sabaté & Wien, 2010). Vernarelli and colleagues (2011) examined energy density against weight status using NHANES data from 2442 children (ages 2-8). Children's dietary energy density (ED) was calculated using total energy (kcal) divided by the weight of the food only (g). Age- and sex- specific quartiles of ED were created for analysis. Weight status was classified using Centers for Disease Control (CDC) - defined BMI percentile cutpoints (Kuczmarski et al., 2002). Obese children had higher dietary ED than lean children. Lower vegetable intake also showed a relationship to high-ED diets. The health benefits of vegetables including obesity preventative effects, support adequate vegetable intake established early in life.

Youth vegetable intake

Children's vegetable intake is far below recommended levels indicating poor dietary quality, with certain subgroups faring worse than others. Based on national dietary data, 93% of children aged 1-18 did not meet vegetable recommendations (NCI, 2015). Kirkpatrick et al. (2012) analyzed NHANES data from 2001-2004 and reported that greater proportions of children in the lowest income group met the minimum recommendations for total vegetables compared with children in the highest income group. However, Hiza and colleagues (2013) found food insecure youth consumed higher proportions of French fries that contributed to total vegetable intake compared to their counterparts residing in food-secure households. Moreover, Healthy Eating Index (HEI) component scores for dark green and orange vegetable subgroups were lower compared to the other vegetable subgroups among all children (ages 2-17). Scores were higher for Hispanic children than white and black children for total as well as dark green and orange vegetables (Hiza et al., 2013). Younger children (ages 2-5) consumed more vegetables compared to their older counterparts (Hiza et al., 2013; Lorson, Melgar-Quinonez, & Taylor, 2009).

Adolescents consumed significantly more vegetables as French fries compared to children aged 2 to 5 and 6 to 11 years. Early adolescence (e.g. 8–12 years old) is a time when children begin to establish independence (Thornburg, 1983) and therefore reflects a window of opportunity to guide their food choices towards healthier options. The evidence that youth are not consuming adequate amounts of vegetables coupled with the increased risk for dietary related diseases from poor dietary quality substantiates the need for research into strategies to increase vegetable intake.

Factors influencing vegetable intake

Liking

Children's liking of vegetables and the relationship to vegetable intake is a robust area of research (Rasmussen et al. 2006; Brug et al. 2008; Wardle et al. 2003; Corsini et al. 2013; Wadhera, Capaldi Phillips, and Wilkie 2015; Wardle et al. 2001; Gibson, Wardle, and Watts 1998). Liking influences motivation and intention, which impacts food choice, especially in youth who are known to eat what they like and avoid what they dislike (Wardle et al. 2003; Brug et al. 2008; Birch 1998; Gibson, Wardle, and Watts 1998). Hypotheses to explain low vegetable intake have identified weak preference and liking for vegetables as barriers (Drewnowski, Henderson, Levine, & Hann, 1999; Wardle, 1995). Large-scale ecological studies have confirmed this direct association. For example, the Pro-Children study, a large scale, cross-sectional study across Europe, reported a positive association between liking the taste of vegetables and daily vegetable intake in 6 of 9 countries (Brug et al., 2008). Studies examining child liking of vegetables have cited bitter taste and low-calorie density as major contributing factors to a child's dislike of vegetables, which can in turn deter intake. Interestingly, mother's liking for vegetables has not been highly predictive of children's intake (Gibson et al., 1998). The bitter taste of many vegetables conflicts with an innate preference for sweet and salty (Birch 1999), thereby constituting a barrier to vegetable intake. However, Dinehart and colleagues (2006) showed bitter

taste was not a strong predictor of vegetable preference. Gibson and Wardle (2003) found energy density was a significant predictor of vegetable liking even when adjusted for total sugar content.

Effective interventions to increase liking of vegetables in childhood are critical (Appleton et al., 2016; Wadhera et al., 2015) because liking and preference can be learned and unlearned at an early age (Rozin, 1990) and then persist into adulthood (Nicklaus, Boggio, Chabanet, & Issanchou, 2004; Skinner, Carruth, Bounds, & Ziegler, 2002). Repeated exposure, associative conditioning, and evaluative conditioning are commonly-tested interventions reported in the literature to increase liking of vegetables (Remington et al. 2012; Corsini et al. 2013; Wardle et al. 2003). Repeated exposure interventions follow the theoretical underpinnings, first hypothesized by Zajonc et al. (1968), that numerous or daily exposures to a novel stimulus will result in familiarity and ultimately liking. Whereas associative conditioning (Capaldi, Hunter, & Lyn, 1997) and evaluative conditioning (Birch, Zimmerman, & Hind, 1981) also include repeated exposure but in addition, pairs a novel vegetable with a positive stimulus (e.g. calories or flavor or social experience) so that the child learns to associate the new vegetable with the favorable stimulus, leading to increased liking of the new vegetables. Overall, these methods are rich with positive findings for increasing child liking of vegetables (Wadhera et al., 2015).

Many researchers have claimed vegetables are the least-liked food group among children (Chu, Farmer, Fung, Kuhle, & Veugelers, 2013; Gibson et al., 1998; Hunt, Carver, & Patton, 1958; Pérez-Rodrigo, Ribas, Serra-Majem, & Aranceta, 2003; J Wardle et al., 2003, 2001; Zeinstra, Koelen, Kok, & de Graaf, 2007). For example, Cooke and Wardle (2005) examined the development of food preferences in children to determine the best and least liked foods. They asked 1,291 4-16 year old British children to complete a 115-item food preference questionnaire. Six of the 10 least liked foods were vegetables (spinach, leeks, green squash, rutabaga, sprouts, and turnip). High fat/sugary foods and fruit were the most well-liked foods.

The limited number of studies that have reported liking of individual vegetables among children have found that some vegetables are commonly liked and others are commonly disliked. Carrots, corn, tomatoes and lettuce were some of the most commonly liked vegetables among population-wide cross sectional studies (Bevan et al., 2016; Chu et al., 2013; Domel et al., 1993; Hunt et al., 1958; Pérez-Rodrigo et al., 2003). Tomato and lettuce were the most preferred vegetables, whereas Brussels sprouts, spinach, and beets have been reported least familiar and therefore least liked (Capaldi-Phillips & Wadhera, 2014; Cooke & Wardle, 2005; Hunt et al., 1958; Trinkaus & Dennis, 1991).

Variety of vegetables eaten

Reports of the association between exposure to a variety of vegetables and vegetable intake are limited in the literature. Consumption of a variety of vegetables is imperative for sufficient dietary quality through intake of a range of vitamins, minerals and fiber (Nicklaus, 2009). Exposing a child to a variety of vegetables is important because childhood is a time of greater openness to modification of food choice (Birch et al. 1990; Wardle 1995). Jones and colleagues (2010) examined factors predictive of fruit and vegetable consumption using 1-day food diaries from a large prospective cohort of British 7 year old children (n = 7,285) (Avon Longitudinal Study of Parents and Children (ALSPAC)). They found children's willingness to try a variety of foods (never, sometimes, most of the time) was one of only 2 factors predictive of vegetable consumption. These large-scale findings (Jones et al., 2010) justify further investigative trials of the impact of the variety of vegetables on intake, but this has not been the case.

Increasing the variety of vegetables as a means to promote children's vegetable consumption has been mainly tested in younger children (infancy to pre-school). Two studies in infancy (Maier-Noth, Schaal, Leathwood, & Issanchou, 2016; Mennella, Nicklaus, Jagolino, & Yourshaw, 2008) showed that a greater variety of vegetables presented in meals increased

vegetable intake, an effect that persisted over the long-term (up to 6 years post infancy) (Maier-Noth et al., 2016). Roe and colleagues (2013) offered cucumber, sweet pepper, and tomato as a snack to pre-school children and found that providing a variety of vegetables increased the amount they chose and ate compared to those children offered only 1 type of vegetable. Bucher and colleagues (2014) sought to replicate promising findings of vegetable variety on meal composition among adults (Bucher, van der Horst, & Siegrist, 2011), but this time in children aged 7-10 years. Children were assigned to 1 of 3 fake food buffets and instructed to serve themselves: 1) chicken and pasta with carrots, 2) chicken and pasta with beans, 3) chicken and pasta with both carrots and beans. They found the percentage of energy from vegetables almost doubled when 2 vegetables were served versus 1, but not at the expense of increased energy of the meal.

Home availability

Home availability of vegetables improves vegetable consumption for youth, especially among adolescents (Jago, Baranowski, & Baranowski, 2007), although null findings have also been reported (Befort et al., 2006; Edmonds, Baranowski, Baranowski, Cullen, & Myres, 2001). Home availability of vegetables has been a critical target of nutrition interventions because it is modifiable through behavior change (Bere & Klepp, 2004; Blanchette & Brug, 2005; Cook, O'Reilly, Derosa, Rohrbach, & Spruijt-Metz, 2014; Cooke & Wardle, 2005; Jago et al., 2007; Neumark-Sztainer, Wall, Perry, & Story, 2003). Increased availability of vegetables interacts with personal factors (e.g. liking), interpersonal factors (e.g. parental consumption/practices/style) and economic factors to result in increased vegetable intake (Jago et al., 2007). Cook and colleagues (2014) conducted a systematic review of 15 studies examining the association between home availability of vegetables and vegetable intake among youth in developed countries. Seven of the studies showed a positive association between home availability of vegetables and vegetable

intake, with 6 of the 7 studies based on child report of home availability. Likewise, among 225 4th-6th graders, Cullen et al. (2003), found increased child-reported availability was a positive predictor of increased child vegetable consumption. A large scale cross-sectional study across 9 European countries found children who “frequently” have vegetables available in their home were more likely to report daily consumption (Brug et al., 2008). One study found that vegetable intake was significantly associated with parental report of home availability for adolescent girls, but not boys (Hanson, Neumark-Sztainer, Eisenberg, Story, & Wall, 2005). Whereas another study found increased home availability of vegetables predicted increased vegetable intake among 473 Boy Scouts ages 11-14 (Gallaway, Jago, Baranowski, Baranowski, & Diamond, 2007). Two separate studies with predominantly African American youth (ages 10-18) reported no relationship between vegetable availability and intake (Befort et al., 2006; Edmonds et al., 2001). For example, Edmonds et al. broadened the definition of availability by including availability in grocery stores, restaurants and homes (using census tract data) of the neighborhoods of the 90 African American Boy Scout participants (Edmonds et al., 2001) and still found a null association between vegetable intake and availability. Findings from another two studies indicated that low-income households purchase fewer types of vegetables and purchase vegetables less frequently compared to higher income households (Ranjit et al., 2015; Turrell, Hewitt, Patterson, Oldenburg, & Gould, 2002). These findings are unsurprising because of the economic constraints faced by low-income families. The generally positive association between home availability of vegetables and intake for many demographic groups validates the importance of availability of vegetables as a focus of interventions aimed to increase vegetable intake.

Meal-time factors

Parental modeling and preferences

Parental influence on children and adolescent nutrition behaviors can stem from parental behaviors. Parents are the primary architects of their children's diets in the home. They directly determine their child's physical and social environment thus indirectly influencing behavior and habits through socialization and modeling (Ritchie, Welk, Styne, Gerstein, & Crawford, 2005). Numerous reviews of environmental correlates of youth dietary intake found parental vegetable intake as one of the most consistent determinants of youth vegetable intake (Brug, van Lenthe, & Kremers, 2006; Pearson, Biddle, & Gorely, 2009; Rasmussen et al., 2006; Van Der Horst et al., 2007). Parental modeling has been found to be a no-cost, high impact strategy to improve vegetable intake, exclusive of a greater presence of vegetables in the home, serving as an actual driver of nutritional behavior change among youth (Bauer, Neumark-Sztainer, Fulkerson, Hannan, & Story, 2011). Draxten and colleagues (2014) investigated whether parental role modeling was associated with children (ages 8-12) meeting daily fruit and vegetable recommendations. The authors collected surveys from both parents and children about parental role modeling of healthful foods. Child dietary intake was collected via 3 24-hr recalls. The authors found positive correlations between parent and child report of parental role modeling of only green salad at dinner and not any other types of vegetables. Maternal consumption was strongly predictive of vegetable consumption among 7,285 children (age 7) in the ALSPAC data (Jones et al., 2010). Although the mother has been found to more commonly present at family meals (McCullough, Robson, & Stark, 2016), Harris and colleagues examined if African American fathers' dietary practices were predictive of their children's dietary consumption. They used self-reports from African American fathers (n = 102) of children (ages 2-13) and hierarchical regression analysis to assess the association. They found child intake of fresh and frozen vegetables was predicted by paternal intake of the same foods.

Child preference & negotiating power

Influence of children's preferences and negotiating powers on foods served within family meals has been assessed through qualitative studies among parents (Fulkerson et al. 2011; Beltran et al. 2017). Parents have indicated that children influence what foods were purchased and available for meals (Beltran et al., 2017), that the limited range of food items children will eat was frustrating (Fulkerson et al. 2011), and that they often put their children's preferences ahead of their own as assurance that food will be eaten, which is a special concern among low-income families (Daniel, 2016). Dixon and Banwell (2004) used focus groups to examine how children exert influence over family diets. Based on their findings, they suggested that children's demands are being responded to more commonly than before and even metaphorically implied they are displacing male adults 'at the head of the table' as parenting practices become more child-centered. Thompson and colleagues (2016) interviewed low-income mothers about the approaches they use to consider their children's preferences during family meals. They dichotomized how children's food preferences affect family meals: 1) "what we fancy" and 2) regulated. The former method was grounded in reactive catering, dominated by repeated negotiating and asking children what to cook for the meal. The latter method involved parents relying less on children's preferences and more on set meals, where variation (e.g. preparing different foods for different children for a meal) rarely occurred. Therefore, if children prefer vegetables, parents may likely plan meals accordingly. One strategy that allows a child to influence what is served during family meals is to teach children to effectively ask for vegetables to be available in the home for meals. A role-playing intervention improved child asking and negotiation skills and showed a positive effect on home vegetable availability that in turn was strongly associated with intake (Baranowski et al., 2000).

Frequency of family meals

Increased frequency of family meals generally shows positive influence on many healthful outcomes of youth including dietary quality (Burgess-Champoux, Larson, Neumark-Sztainer, Hannan, & Story, 2009; Gillman, 2000), weight status/obesity (Fulkerson, Neumark-Sztainer, Hannan, & Story, 2008), and a protective effect for risky behaviors including disordered eating (Neumark-Sztainer, Eisenberg, Fulkerson, Story, & Larson, 2008; Skeer & Ballard, 2013). Videon and colleagues (2003) analyzed the National Longitudinal Study of Adolescent Health data to examine family meal frequency on dietary outcomes. They found adolescents who ate 6 or 7 family meals/week were less likely to report poor consumption of vegetables than adolescents who ate 4 or 5 family meals/week. Another study that examined the same association within a similar age group found the odds of eating the recommended amounts of fruit and vegetables increased by 45% with a 1-category increase in family dinner frequency (most days versus never or some days, or every day versus most days) (Gillman, 2000). Despite positive associations between number of shared family meals a week and improved dietary quality, a review of structural characteristics of family meals found the frequency of family meals/week declined from 2nd to 8th grade (McCullough et al., 2016).

Serving style of vegetables during meals

Research regarding how vegetables are served during meals may identify specific factors within meals that impact vegetable intake. Family-style and pre-plated are the more often studied serving styles. Family-style allows children to select their own portions of a target food by serving themselves during a meal. Family-style has been hypothesized to promote the child's self-regulation (use hunger level in food selection) and responsive feeding (Satter, 1990) (providing the child with healthy food options at consistent meal times but giving them the freedom to choose how much). The pre-plating serving style involves having a caregiver portioning the items

on the plate and then serving to the child. Loth and colleagues (2017) compared the effects of these 2 serving styles plus a hybrid of both (i.e. combination) on average daily fruit and vegetable servings in a cohort of children in a family-centered intervention to improve dietary practices. They analyzed parent-reported data on family meal environment from 75 participants and child dietary data collected through 3 24-hr recalls. No significant associations were determined between any of the different serving styles and average daily fruit and vegetable servings. Another study found serving style was predictive of intake, but in a setting outside the home. Harnack and colleagues (2012) compared different serving styles of fruit and vegetables on actual intake for 53 children at a HeadStart pre-school center using a randomized cross-over design. Fruit and vegetables were served in 2 ways: pre-plated by providers and served in advance of a family-style meal where they were also included on the table. The control consisted of fruit and vegetables served family style where all items were served at once. Fruit intake was higher when served in advance compared to the control. When children were served pre-plated fruit and vegetables, lower fruit and vegetable intakes resulted and energy intake was higher compared to the control. Overall, inconsistent results render serving style worthy of further study.

1.4 Cooking interventions

Increased consumption of meals away from home, increased reliance on convenience foods, (Smith, Ng, & Popkin, 2013) and a decline in cooking meals at home (United States Department of Agriculture, 2014) are trends under public health scrutiny. These trends have been implicated as contributing to the decline in diet quality and increased obesity risk (Dyck et al., 2014; van der Horst, Brunner, & Siegrist, 2011), especially among low-income families (Wolfson & Bleich, 2015). Wolfson and Bleich (2015) found the association between frequent cooking at home (greater than 6 times/week) and increased consumption of fresh vegetables was limited to only those ineligible for SNAP. Meals prepared from scratch at home were higher in nutritional

quality and resulted in greater inclusion of vegetables compared to meals consumed or prepared away from home (Ayala et al., 2008; Lachat et al., 2012; Larson, Story, Eisenberg, & Neumark-Sztainer, 2006; Mclaughlin et al., 2003). As such, cooking skills interventions that promote skills of home cooking have been gaining importance on public health agendas.

Cooking skills interventions are framed within behavior theories such as Social Cognitive Theory (SCT) in order to achieve the desired behavior changes to improve dietary practices and choices (Fulkerson et al. 2010; Share Our Strength 2017). SCT, first postulated by Alfred Bandura (1986), is an interpersonal theory that emphasizes the dynamic interaction between personal factors, behavior, and environments in order to elicit behavior change. Core constructs of this framework (Bandura 2004) that are especially relevant to cooking skills interventions include self-efficacy, perceived facilitators and barriers of behavior, outcome expectations, and self-regulation. Cooking skills interventions aim to improve facilitators of home-cooked meals including cooking confidence, nutrition knowledge, liking of vegetables, variety of vegetables eaten, and home availability of vegetables (Chen et al., 2014; Condrasky, Graham, & Kamp, 2006; Hartmann, Dohle, & Siegrist, 2013; Larson et al., 2006). Previous studies have established these factors as precursors to improved dietary intake (e.g. increased vegetable consumption), that can be sustained over time (Brug et al., 2008; Burton, Reid, Worsley, & Mavondo, 2017; Lally, Van Jaarsveld, Potts, & Wardle, 2010; Larson, Neumark-Sztainer, Hannan, & Story, 2007).

Cooking skills interventions have generally produced positive effects on a variety of self-confidence measures related to dietary change. Two recent systematic reviews touted the general effectiveness of cooking skills interventions for increasing confidence in food preparation skills, potentially improving dietary quality (Garcia, Reardon, McDonald, & Vargas-Garcia, 2016; Reicks, Trofholz, Stang, & Laska, 2014). Pooler and colleagues (2017) determined the long-term impact of Share our Strength's® Cooking Matters for Adults, a program grounded in SCT, on

self-confidence and food resource management. Cooking Matters targets low-income populations, similar to other programs (Robson, Odar, and Stark 2016; Fulkerson et al. 2010; Wrieden et al. 2007) and educates them to shop for and prepare healthy meals using hands-on preparation activities, nutrition education and discussion. Pooler et al. (2017) used a quasi-experimental design with a nonequivalent comparison group to assess immediate and long-term outcomes at 3- and 6-month follow-up based on surveys from 332 Cooking Matters participants and 336 from the control group. Compared to the control group at six-months post-course, the Cooking Matters participants improved 3 outcome measures: food resource management practices ($p = 0.002$), food resource management confidence ($p < 0.001$), and less worry that food would run out before they had money to buy more ($p = 0.03$).

More recently, several cooking interventions have recruited parent and child pairs (Fulkerson et al. 2010; Robson, Odar, and Stark 2016) with mixed results. Familial participation can evoke a positive social experience and promote a sense of connectedness which may lead to increased liking of targeted foods (e.g. vegetables) as proposed by the Evaluative Conditioning Theory (Birch, Zimmerman, and Hind 1981). These programs address some parents' desire for increased help from children in meal preparation (Fulkerson et al. 2011). Fulkerson and colleagues' HOME Plus study was the first large-scale randomized control trial (RCT) to examine the impact of a family meals intervention that engaged the entire family on a variety of behavioral and health outcomes. Largely framed within SCT, 160 parent-child pairs (child 8 -12 years) were randomized to the intervention or attention-only control. The intervention was delivered monthly for 10 months to groups of whole families (4-8 families per meeting) at nearby community centers. The intervention included supportive phone calls (5 total) by research staff throughout the 10 months, and two follow-up home visits 12 and 21 months post randomization. Each meeting included interactive nutrition education, taste testing, building cooking skills, and

hands-on meal preparation. They found a positive intervention effect (compared to the control) for: 1) parental self-efficacy for identifying appropriate portion sizes and 2) consumption of sugar-sweetened beverages. Despite assessing numerous family home food environment, parent personal/behavioral, child personal/behavioral, and dietary outcomes, only two outcomes were positively impacted by the innovative intervention. Intervention children were less likely to consume 1 sugar-sweetened beverage daily than control children. Robson and colleagues (2016) produced more positive outcomes, but with a much smaller pilot study population (6 participant pairs) with no control comparison. They tested a parent-child cooking intervention's effect on the number of family meals eaten outside the home. Participant pairs met for 10-weekly cooking sessions at a kitchen on a college campus. They found a large effect size on the main outcome measure, proportion of dinners consumed outside the home, which significantly decreased from 56% to 25% (pre- to post-intervention). Home-prepared meals increased from 44% to 75%. The substantial differences including study design, sample size, and outcome measures, between these 2 studies prohibits comparisons. What can be discerned is that neither intervention improved major dietary outcomes (e.g. average intake of energy at dinner); therefore additional research with a family-centered approach is still warranted.

1.5 Behavioral economics

Overview

Rooted in both economics and psychology, behavioral economics utilizes principles of libertarian paternalism (the ability to affect behavior without limiting choice), 'nudges' (small actions that influence choice), and choice architecture (organizing the context in which people make decisions) (Thaler & Sunstein, 2003; Thaler et al., 2010). These principles theorize that slight modifications to the social and physical environments can shift behaviors towards self-interest and optimal state without limiting choice (Johnson et al., 2012; Thaler & Sunstein, 2003;

Thaler et al., 2010). Behavioral economics defines the various patterns of behavior that do not fit the traditional economic model of decision making (Thaler & Sunstein, 2003). The traditional model postulates people, given the information, resources, and preferences, rely on rational reasoning to achieve the most optimal state. Behavioral economics is germane to the obesity epidemic by addressing the irrational thought and behavior that often governs our nutritional choices. That is, despite the knowledge of the existence of a more healthy food choice, choices are more often driven by irrational decision processes (e.g. hunger), with no regard to future status (Loewenstein, Brennan, & Volpp, 2007). In the case of youth, applying behavioral economics to some facets of the environment (e.g. home) helps exploit their instinctive, rather than deliberate food choice decisions, which could ultimately bias them towards increasing less-energy dense and nutrient-rich food choices like vegetables .

Behavioral economics interventions

School vs. home

The majority of interventions informed by behavioral economics to increase vegetable consumption have been conducted in the school setting, with few trials testing similar strategies at home. A reported 95% of children aged 5-17 spend approximately 6 hours each weekday in school (Snyder & Dillow, 2012) thereby allowing population-level interventions to be tested in a real-world setting such as the school lunch line (Wansink, 2013). The momentum of behavioral economics in the school setting supports the need for similar studies in the home. Behavioral economics offers low/no cost and unobtrusive in-home strategies that appeal to both participant and researcher. Because the home is where children consume up to 2/3 of their daily energy intake (Poti & Popkin, 2011), effective in-home interventions for increasing vegetable intake should be an investigative priority, yet a limited number of studies exist. Leak et al. (2017) tested for differences in vegetable intake between a number of parent-led behavioral economics-

informed strategies implemented in the home. The intervention encouraged parents of 9-12 year old low-income children to implement a different strategy weekly at home for six weeks. They found serving two vegetables with the dinner meal strategy resulted in greater vegetable intake relative to two other strategies.

The following sections describe more studies set in a variety of settings, organized by the type of behavioral economics-informed strategy tested.

Child involvement in food preparation

Having children help with food preparation has shown to benefit several outcomes including eating enjoyment (van der Horst, 2012), improved dietary intake and quality (Chu, Storey, & Veugelers, 2014; Cullen, Watson, Zakeri, Baranowski, & Baranowski, 2007; Larson et al., 2006), and greater nutritional knowledge and self-efficacy (Anliker, Laus, Samonds, & Beal, 1992; Hersch, Perdue, Ambroz, & Boucher, 2014). Van der Horst and colleagues (v2014) investigated the influence of children's involvement in meal preparation on intake of different kinds of foods. Parent-child pairs were randomly assigned to participate in a one-time meal preparation session, immediately followed by consuming the meal. Children actively prepared the meal with assistance from the parent in the intervention group, whereas the control parents solely prepared the meal while the child was present. Cooked cauliflower and a side salad were the two vegetables included in the meal. The authors found the children in the intervention group ate more salad compared to the control children. The authors hypothesized the greater autonomy in salad preparation (e.g. choosing which veggies and deciding amounts) by the children contributed to their findings. Jarpe-Ratner and colleagues (2016) conducted an evaluation of an experiential cooking and nutrition education program for low-income youth (grade 3-8) for its immediate effectiveness on fruit and vegetable consumption. The 10-session, chef-led program consisted of nutrition lessons, culinary instruction, and recipe preparation activities that promoted the child

helping prepare meals at home. Using pre- and post-course surveys completed by parents and children, they found both vegetable intake and frequency of child cooking at home improved over the duration of the course.

Serve ware manipulation

The studies that tested physical aspects of the serve ware (e.g. plate and bowl size) on consumption levels have generally found positive associations, especially for energy-dense, palatable foods (Wansink, van Ittersum, & Painter, 2006). Serve ware can unknowingly influence (nudge) how much consumers serve and consume (Wansink & Cheney, 2005). Reicks et al. (2012) improved the presentation of healthier food choices by placement of colored pictures of green beans and carrots in tray compartments in a school lunch setting. The percentage of students choosing those vegetables while in the lunch line significantly increased, ultimately translating into an overall increase of the vegetable consumption per student exposed. Additional studies used size of the serve ware as the independent factor of interest. Libotte and colleagues (2014) used a fake food buffet to examine the influence of plate size on food choices and amounts. The participants who used larger plates served themselves more vegetables (M = 49 kcal), compared to participants who used the smaller size plates (M = 38 kJ). Plate size did not affect portions of other food categories (e.g. sweets, protein sources and starchy foods, fruits foods). Likewise, Van Kleef et al. (2012) determined how size of serving bowl affected how much pasta a person self-served and consumed. In a between-subjects experiment, they found those who served themselves pasta into large-sized bowls ate more compared to those with medium-sized bowls. The visually eye-catching colors of MyPlate, the iconic representation of the 2010 Dietary Guidelines for Americans (Levine, Abbatangelo-Gray, Mobley, McLaughlin, & Herzog, 2012) falls within the idea of improved presentation of a visual cue to help impact dietary intake. An online survey was completed by 497 mothers of school-aged children to assess

its appeal and usefulness. MyPlate's awareness and usage was attributable to its message clarity and relevancy. MyPlate's usage was highest among people with a strong preference for vegetables (Wansink & Kranz, 2013). Visual cues in the form of serve wear size or appearance may encourage appropriate portions of servings of vegetables for consumption.

Improving convenience and visibility

Studies increasing the availability (i.e. convenience) and visibility of targeted foods have produced inconsistent results. Wansink and colleagues' (2006) aimed to determine how proximity and visibility of candy placement affected consumption. In an office setting, proximity of a candy bowl was manipulated by placing it on the desk or 2 m from the desk of the participant. Visibility was manipulated by using clear or opaque lids on the bowls. Participants ate 1.8 more candies/day when the candy was placed on their desk vs. 2 m away and 2.2 more/day when the bowl had a clear lid versus an opaque one. A trial set in high school focused on the impact of convenience by converting 1 of 2 lunch lines into offering only healthy entrees (e.g. vegetable sub sandwich) and sides (e.g. fruits and vegetables) and the other lunch line offering standard options that included both healthy and less healthy entrees (e.g. chicken patties, tacos, salad, hamburgers) (Hanks et al. 2012). Convenience of the healthier options line relied on making these options quick, easy, all in one place, and without competition from less healthy items. Consumption of the less healthy foods significantly decreased by 28% (from 182 g to 132 g per student). Another study investigated increasing convenience of vegetables by mandating a cash-only policy, instead of allowing a school credit account for the purchase of soft drinks and calorically empty desserts in a high school setting while healthier options could still be purchased using the school credit account (Just, Mancino, & Wansink, 2007). The modification of purchase power drove an increase in sales of healthier food options and a decrease in sales of unhealthy food/beverage choices, but not at the expense of school lunch participation or revenue, an

important factor for many schools administrators. Schwartz and colleagues (2015) tested the impact of two strategies together: improving availability/visibility and serving first, on increasing fruit, vegetable, and milk intake. They hypothesized that serving the fruit, vegetables, and milk before the meal and making these three items the most available and visible items during the meal by taking away the meat and grain from the table, would result in increased intake of all three healthier options. Using a within-subjects crossover study design among 85 pre-school children, they found the combination of the 2 strategies only led to significant increases for milk for all meals. They attributed their null findings to the *ceiling effect* in that the children had high baseline intake of fruit and vegetables.

Increasing the number of healthier choices

Increasing the variety of vegetables by offering a choice of 2 or more vegetables (choice-offering) and its effect on intake has been explored in several studies with mixed results. Rohlf's and colleagues (2013) assessed the effect of number of vegetables offered during a meal on intake. They assigned 152 parent-child pairs (child aged 4-6) into 3 conditions: 1) one choice between 2 vegetables at the beginning of the meal, 2) having a variety of vegetables available during the meal and 3) only 1 vegetable offered. Vegetable intake was higher for the choice-offering conditions (mean vegetable intake greater than 40 g for both conditions) compared separately to the no-choice group (mean vegetable intake ~ 20 g). They detected no difference between the two *choice* conditions. Other studies comparing the offering of a choice to the no-choice have not observed increases in vegetable intake in the choice condition. de Wild and colleagues (2015) investigated whether choice-offering of vegetables would increase intake of children at home. They randomized 70 children into 2 conditions: 1) choice (two familiar vegetables offered at the meal), and 2) no-choice (one familiar vegetable offered at the meal). Each child was exposed 12 times to 6 familiar target vegetables at home during dinner. There was

no significant effect of group (no choice vs. choice) on vegetable intake, even though the choice group had the option to choose 1 or both of the vegetables offered. Their results are consistent with Zeinstra et al., who also observed no effect of choice-offering of familiar vegetables (conditions: pre-meal choice, choice during meal, and no-choice) on vegetable intake but in a “pleasant” restaurant setting (Zeinstra, Renes, Koelen, Kok, & De Graaf, 2010).

First in isolation creates optimal default

Serving vegetables before the meal is an easily practiced strategy that may ‘nudge’ children towards greater consumption. It follows the idea that when vegetables do not have more palatable options to compete with, more vegetables in total may be consumed. Redden et al. (2015) tested whether serving the vegetable first and in isolation would increase consumption by distributing carrots or broccoli to children while they were waiting in a school lunch line. The researchers hypothesized that the vegetables served in isolation was suggestive of a default choice and would increase overall vegetable consumption by not having to compete with other energy dense, less nutritious options further down the lunch line. Students consumed significantly more carrots over the intervention day versus the control day (mean intervention = 12.7 g vs. mean control = 2.4 g). In addition, the likelihood of choosing carrots further down the lunch line did not differ by treatment days. These results are in agreement with another similarly designed study that tested bell peppers served first and in isolation (Elsbernd et al., 2016). Another study that served vegetable soup, a low-energy pre-loader, reported an increase in total vegetable consumption (Spill, Birch, Roe, & Rolls, 2011). Rolls and colleagues found that salad served before the meal increased total vegetable intake (Rolls, Roe, & Meengs, 2004). However, Harnack and colleagues’ trial set in Head Start centers found serving fruit first subsequently led to an increase in fruit consumption, but the same positive effect was not seen for vegetables when served alone first (Harnack et al., 2012).

Manipulating portion size

Manipulating portion size can act as a visual cue to determine how much a person eats (Wadhera & Capaldi-Phillips, 2014). Framed within the Ebbinghaus-Titchener size-contrast illusion (perceived size of something is altered by the sizes of factors immediately surrounding it (Franz, 2003), using a bigger spoon to serve the food can lead to larger portions served and eventually eaten. Wansink et al. (2006) tested difference sizes of ice cream scoops on consumption of ice cream. They found participants ate 14.5% more ice cream when the scoop size was increased by 50%, irrespective of the bowl size. Likewise, other studies have found a positive effect of increasing portion size on intake, without serving spoon manipulation (Fisher & Kral, 2008; Fisher, Liu, Birch, & Rolls, 2007). Kral et al. (2010) tested the effect of increasing portion sizes on fruit and vegetable intake for young children. They doubled the portions of the fruit/vegetable side dishes (cooked broccoli, carrots, and applesauce) served together during the meal, but held the accompanying main pasta entrée constant. Vegetable intake was not affected, unlike the fruit, which increased 43%. This implied increasing portion size did not impact vegetable intake when other more energy-dense competing foods were available. Mathias and colleagues (2012) sought to disentangle the effect of portion size on intakes of vegetables and fruit separately. Children ages 4-6, who found fruits and vegetables generally acceptable, participated in a 2 X 2 within-subjects study design that varied portion sizes of the fruit/vegetable side dishes that were served within a meal. They found that doubling portion sizes increased vegetable intake by 37% (1/5th of a serving increase), and fruit intake by 70%. Spill and colleagues (2010) focused solely on carrots to test their hypothesis that increasing the portion size served at the start of a meal would increase total vegetable intake as well as decrease meal energy for young children (ages 3-5). Doubling the portion size of the first-course carrots from 30 g to 60

g led to an increase in carrot intake by 47%. These results were promising for both increased portion size and serving vegetables first strategies (Spill et al., 2010).

Other strategies

Cravener et al. (2015) conducted a small pilot control-intervention study (n = 24) based in the home to increase vegetable intake of young children (ages 3-4) identified as low-vegetable consumers (less than 2 vegetables/day). They tested the effectiveness of pairing the strategies of making vegetables the default option and making them the more attractive snack (i.e. cartoon character packaging). The granola (less healthy option) was offered but made less convenient (i.e. a 5-minute wait period to receive) and without the attractive packaging. The paired strategies increased vegetable intake by 1 vegetable serving/day (Cravener et al., 2015).

1.6 Summary

High obesity rates remain a critical issue among children in the United States. Children are far from meeting the recommended dietary recommendations for vegetables, despite the established health benefits of a diet with adequate vegetable intake. Liking of vegetables, variety of vegetables consumed, home availability of vegetables and meal-time factors (e.g. frequency of shared family meals, parental influence, serving style) have been widely addressed in the literature. Interventions to increase vegetable intake among children remain high on public health nutrition agendas.

The field of behavioral economics offers novel approaches to traditional behavioral interventions to increase vegetable intake for children. By accounting for the irrational decision making process (i.e. hunger, convenience) that often drives food choices, behavioral economics-informed strategies offer parents small, low-to-no cost alterations in their home food environment with the potential to increase their children's vegetable intake. Similar strategies have found success in school settings. Examples of behavioral economics-informed strategies include: 1)

having the child help with preparing meals/vegetables 2) using serve ware that may ‘nudge’ children to eat more vegetables by presenting them more attractively and in the correct proportions, 3) making the vegetables the most available and visible part of the meal, and 4) serving at least 2 vegetables with the meal. A search of the relevant literature determined a lack of a large-scale intervention that tested behavioral economics-informed strategies to increase vegetable intake among children in their home.

1.7 Research Objectives and Hypotheses

Chapter 2

Objective: To determine if an intervention that consisted of 6 strategies informed by behavioral economics paired within a cooking skills course, improved child vegetable intake and other associated factors (e.g. liking of vegetables, variety of vegetables tried, home availability of vegetables, and BMI-z score) more than a control condition that was the cooking skills course alone.

Hypothesis: Compared to children in the control group, children in the intervention group would have a greater increase in vegetable intake, liking, and variety from baseline to immediate post-intervention. Improvements were expected to be maintained at 2 follow-up time points (at 6 and 12 months post intervention) compared to control children.

Chapter 3

Objective: To evaluate the impact of a vegetable-focused cooking skills and nutrition program on parent and child psychosocial measures, vegetable liking, number of vegetables tried, and home availability of vegetables.

Hypothesis: Participation in the vegetable-focused curriculum that included chef demonstration, hands-on food preparation, and nutrition education lessons would lead to improvements across parent and child psychosocial measures, vegetable liking, number of vegetables tried, and home availability of vegetables.

Chapter 4

Objective: To measure vegetable liking and acceptability for a wide variety of vegetables by a racially and ethnically diverse population of 9-12 year old low-income children.

Hypothesis: Children find a wide variety of vegetables acceptable.

Chapter 2: A controlled-intervention trial to increase child vegetable intake through parent-implemented behavioral strategies

2.1 OVERVIEW

Vegetable intake for children falls well below the dietary recommendations. The objective of this study was to determine whether a parent-child vegetable cooking skills program and parent-led strategies informed by behavioral economics improved vegetable outcomes of a racially and ethnically diverse sample of low-income children (ages 9-12) more than a vegetable cooking skills program alone. A nonrandomized, controlled trial compared a weekly cooking skills program enhanced to emphasize vegetable preparation, procurement and intake (control group) with the same weekly cooking skills program plus parent-led strategies (1/week over 6 weeks) (intervention group). The primary outcomes were child vegetable intake, child dietary quality, child vegetable liking, variety of vegetables tried, home availability of vegetables, and child measured Body Mass Index. Outcome measures were collected at baseline, immediate post-course, 6 and 12 months follow-up. Mixed model regression analysis with fixed independent effects (group, time point, and group x time interaction) was used to compare outcomes between groups. A total of 103 parent/child pairs (intervention = 49, control = 54) were enrolled and 91 (intervention = 44, control = 47) completed the weekly cooking skills program. The intervention did not improve total child vegetable intake. Intervention children ate more deep yellow vegetables ($p = 0.048$) and white potatoes ($p = 0.046$) than control children at 6 months and increased dark green vegetable intake from immediate post-course to 12 months (interaction effect $p = 0.03$). Number of vegetables children tried increased and mean vegetable liking decreased over time for both control and intervention children. Further studies are needed to determine how behavioral economics-informed in-home interventions can be improved to produce positive dietary outcomes among low-income racially and ethnically diverse children.

2.2 INTRODUCTION

Despite evidence that vegetables promote healthy weight, diet quality, and reduced risk of chronic disease (Slavin & Lloyd, 2012), intake among children falls well below the dietary recommendations (NCI, 2015). Vegetable consumption can displace intake of high energy-dense foods, leading to a reduction in daily calories, and in turn, reduced BMI and adiposity (Pérez-Escamilla et al., 2012; Sabaté & Wien, 2010). Focusing efforts to improve children's vegetable intake within their own food environments has potential for wide-spread public health impact.

Interventions to increase home vegetable consumption by children represent an important area of obesity prevention research. Almost 70% of daily calories are consumed at home (Poti & Popkin, 2011). Meals prepared from scratch at home have higher diet quality and result in greater vegetable intake compared to meals consumed away from home (Guthrie, Lin, & Frazao, 2002; Winkler & Turrell, 2009). However, the limited number of intervention trials set in the home with child vegetable intake as a primary outcome have produced mixed results (Appleton et al., 2016). For example, Remington and colleagues tested if parent-administered repeated taste exposures paired with reward incentive in the home would increase intake and liking of vegetables among young children compared to a no-treatment control group. They found a positive intervention effect on both liking and intake of the target vegetable that was maintained at 3-month follow-up (Remington et al., 2012). Whereas Fulkerson and colleagues (2017) found that a family-focused cooking skills and taste exposure intervention (HOME Plus) implemented by parents in their homes did not increase children's overall vegetable intake. Home implementation of a video and taste exposure program (*Food Dudes*) was also not effective in increasing child vegetable intake compared to a control group (Upton, Upton, & Taylor, 2013), despite the same intervention procedure increasing vegetable intake among children during lunch in a school cafeteria setting

(Taylor, Darby, Upton, & Upton, 2013). The limited number of in-home intervention studies and inconsistent findings indicate the need to better understand how to successfully increase vegetable intake among children using in-home intervention strategies.

Behavioral economics is a relatively new field that when applied to food choice, has the potential to produce widespread nutritional benefit (List & Samek, 2015). It utilizes principles of libertarian paternalism (the ability to affect behavior without limiting choice), ‘nudges’ (small actions that influence choice), and choice architecture (organizing the context in which people make decisions) (Thaler & Sunstein, 2003; Thaler et al., 2010). Behavioral economics posits that modifications to the social and physical environments may shift behaviors toward an optimal state without limiting choice (Johnson et al., 2012; Thaler & Sunstein, 2003; Thaler et al., 2010).

The majority of interventions informed by behavioral economics to increase vegetable consumption have been conducted in the school setting, with few trials testing similar strategies at home. Successful strategies in schools involved serving vegetables first and in isolation (Elsbernd et al., 2016; Redden et al., 2015), improving the presentation of vegetables (e.g. colorful pictures in lunch trays) (Reicks et al., 2012; Wansink, Just, Payne, & Klinger, 2012), increasing the convenience and visibility of vegetables (Hanks et al., 2012), increasing the variety of vegetables offered (Just, Lund, & Price, 2012) and increasing the portion size of the vegetable served (Miller et al., 2015). Cravener et al. (2015) conducted a small pilot control-intervention study (n = 24) based in the home to increase vegetable intake of young children identified as low-vegetable consumers. They tested the effectiveness of pairing the strategies of making vegetables the default option and making them the more attractive snack (i.e. cartoon character packaging). The paired strategies increased vegetable intake by 1 vegetable serving/day. Leak et al. (2017) tested for differences in vegetable intake between a number of parent-led behavioral strategies. Their intervention had parents of 9-12 year old low-income children implement a different

strategy weekly for six weeks. They found serving two vegetables with the dinner meal strategy resulted in greater vegetable intake relative to two other strategies. de Wild and colleagues found that offering a choice of vegetables (i.e. 2 vegetables versus 1 vegetable) for the meal did not predict vegetable intake (de Wild et al., 2015). Given the positive results from school-based studies and mixed results from home-based studies, further studies in the home, especially among older children, are still warranted.

A comprehensive home-based intervention should ideally address individual, environmental, and behavioral factors related to child vegetable intake by following an organizing framework grounded in behavioral theory such as the Social Cognitive Theory (Bandura, 1986). For example, children's liking of vegetables affects motivation and intention, which impacts intake, especially in youth who are known to eat what they like and avoid what they dislike (Birch, 1998; Brug et al., 2008; Wardle et al., 2003). Home availability of vegetables is a well-established environmental predictor of child and adolescent dietary choices and consumption (Rasmussen et al., 2006) and is influenced by parental modeling (Draxten, Fulkerson, Friend, Flattum, & Schow, 2014; Rasmussen et al., 2006). Applying theoretical constructs to address factors associated with vegetable intake such as liking and availability may be effective in improving and sustaining behavioral change.

The primary objective of this study was to test the effectiveness of an intervention that used an enhanced Cooking Matters® for Families program (www.cookingmatters.org) as a vehicle to test in-home behavioral strategies derived from behavioral economics, for increasing vegetable intake of low-income 9-12 year old children compared to a control condition that did not implement in-home strategies. The cooking skills sessions of the Cooking Matters for Families program seemed an ideal platform to test the intervention as the session objectives could be matched to complementary in-home behavioral strategies. This controlled intervention trial

also tested the intervention's effectiveness for improvements in child liking of vegetables, variety of vegetables tried, home availability of vegetables, child dietary quality, child total energy intake, and child Body Mass Index (BMI).

2.3 METHODS

Overview of Study Design

This was a controlled intervention trial set in low-income communities throughout the Minneapolis/St. Paul metropolitan area involving parent/child (9-12 years) pairs recruited to be balanced among intervention and control courses at host sites. Share our Strength's® Cooking Matters for Families cooking skills program (6 total sessions), delivered to both intervention and control groups, was enhanced to provide greater emphasis on vegetable preparation, procurement, and intake. Intervention group parents were also asked to implement a new behavioral strategy each week. Strategies were tested for feasibility in a pilot study (Leak et al., 2017) and incorporated into the Cooking Matters for Families cooking skills sessions. All outcome measurements were collected at four time points: baseline, immediate post-course, 6-month follow-up, and 12-month follow-up.

Participants

Parent-child pairs were recruited primarily through flyer/email campaigns at host sites serving low-income families including subsidized housing, schools, churches, and community centers (Appendix 7.1). Sample size calculation estimated that 100 hundred parent/child pairs, equally distributed between the intervention condition and the control condition were required. This number would allow for detection of an effect size (vegetable consumption in servings) of 0.57 standard deviations with 80% power accounting for a 20% drop out rate. Eligibility criteria included: 1) participant child must be 9-12 years old; 2) parent must be the main food preparer for the household, 3) the family must qualify for some form of public assistance, 4) have a phone, 5)

must not have participated in a previous Cooking Matters for Families in the past 3 years; and 6) be able to read, speak, and understand English (or Spanish for Spanish-only sites (Appendix 7.2). To help enhance study retention, parents and children were paid at the four time points when outcome measurements were collected. The University of Minnesota Institutional Review Board approved the study (Appendix 7.3 and 7.4).

Sites

From September 2014 to June 2016, 15 courses were conducted at 11 host sites. Host sites were identified using the University of Minnesota Extension Cooking Matters network. Four of the 15 courses were Spanish-only courses, led by a bilingual nutrition educator. Outcome measurement tools were translated into Spanish and back-translated into English prior to use, except for the Cooking Matters for Families instrument which was available in Spanish. Course enrollment across sites ranged from 3-16 parent-child pairs.

Procedure

The general format of each 2 hr cooking skills session, delivered to both control and intervention groups, consisted of 1) a professional chef demonstrating a recipe, 2) parent/child pairs preparing the recipe under the guidance of both the chef and a nutrition educator, 3) a trained nutrition educator delivering a nutrition education lesson, and 4) participants eating a family-style meal prepared by the participants and chef during the session. Families took home a bag of groceries that included all the ingredients used during the session to prepare the meal at home.

Intervention parents participated in an additional 20-25-minute segment led by the nutrition educator where the week's behavioral strategy was introduced (Appendix 7.18). The following six behavioral strategies were introduced (one each week) as a segment of each cooking skills session: 1) have your child help prepare vegetables for meals (*Child Help*), 2) use a

plate that shows the amount of vegetables to include for a meal (*MyPlate*), 3) make vegetables visible and accessible by removing other foods from the dining area during the meal and leaving the vegetables (*Make Avail/Visible*), 4) serve at least 2 vegetables with the meal (*Serve 2*), 5) serve vegetables before the meal (*Serve First*), and 6) use a bigger spoon to serve the vegetables (*Big Spoon*) (Appendix 7.19). Each behavioral strategy was matched to one of the enhanced Cooking Matters cooking skills sessions and recipes that would best promote or complement the strategy. For example, the strategy *Serve 2* was incorporated in the session entitled “The Power of Planning”. In this session parents discussed how meal planning in advance would make serving 2 vegetables for dinner easier to implement.

Preceding study launch, nutrition educators attended a series of trainings led by the study team. Nutrition educators followed the same scripted format for each intervention segment: 1) introduce the new strategy, 2) provide examples for implementation, 3) troubleshoot problems with implementation, and 4) assist with plans to use the strategy. During the intervention segment in the week following the introduction of the new strategy, the nutrition educator asked how the strategy was implemented, what barriers and facilitators affected use of the strategy, and whether the strategy improved child vegetable intake. Some strategies required additional supplies such as acrylic MyPlates and a Big Spoon (1/2 cup/240 ml) that were given in the take-home grocery bags for the families.

Outcome Measures

Dietary Intake

Child vegetable intake, child total energy intake, and dietary quality (i.e., Healthy Index 2010 scores), were assessed using 24-hr dietary recalls collected via Nutrition Data System for Research (NDSR) software (versions 2014-2016), a validated dietary analysis program supported by the Nutrition Coordinating Center (NCC), at the University of Minnesota, Minneapolis,

Minnesota. Research staff trained and certified by NCC staff collected 3 24-hr dietary recalls in-person and over the phone at each outcome measurement time point. Research staff prioritized collecting one weekend-day and 2 non-consecutive weekdays, a combination that has been reported as “ideal” in assessing usual intake (Willett, 2013). To increase accuracy of the recalls, staff used visual aids (e.g. cups, bowls, measurement tools, and models of vegetables) and the NDSR Food Amounts Booklet when conducting the recalls in person, and asked for parent assistance if necessary. Individual daily recalls were excluded (n = 29) if they were deemed biologically implausible (i.e. less than 500 kcal/day or if total vegetable intake exceeded 7 cups). Total vegetable intake, total non-fried vegetable intake, and total energy intake were generated using output reports generated in NDSR (version 2016). Vegetable and total energy intake data were averaged across days for each time point. Healthy Eating Index (HEI) 2010 scores (Guenther et al., 2013) were calculated to assess dietary quality. After formatting the dietary recall data for analysis per NCC guidelines, total HEI and HEI vegetable component scores were calculated using a SAS® program (version 9.4) (SAS Institute Inc. Cary, NC 2014), created by National Institutes of Health-NCI, Division of Cancer Control & Population Studies (NCI Epidemiology and Genomics Research Program, 2016).

Child Liking and Variety

Children rated their liking of 37 different vegetables on an iPad survey (QuickTapSurvey®) (Appendix 7.14). The question “Have you ever tried (name of vegetable)” was first asked for each vegetable. If the child answered yes, the next screen asked the child to rate their liking of the vegetable by sliding a finger across a 10-point labeled hedonic scale (1- “Hate it” to 5- “It’s okay” to 10-“Love it”). If they answered ‘no,’ the next screen asked about “ever trying” the next vegetable. A handout with colored pictures of all the vegetables presented in the same order as in the survey was provided as a visual aid. An aggregate vegetable liking

score representing mean liking for all vegetables for all children by treatment group was calculated. Variety was calculated by first summing the number of vegetables for which the child answered “yes” to the “ever had” question, followed by calculating the mean number of vegetables tried by treatment group.

Home Vegetable Availability

Parents were asked to complete a validated Home Food Inventory developed by Fulkerson and colleagues (2008) to self-report the availability of 35 vegetables currently in their home (Appendices 7.7 and 7.13). The home food inventory included a 1-page cover sheet with instructions to inspect all areas of the home where vegetables were stored (refrigerator, freezer, pantries, and cupboards). Vegetables were listed in separate rows in a checklist type format with “yes/no” response options to check for 3 columns per row: fresh, can/jar, frozen. To improve accuracy of the self-reported inventory, research staff reviewed the instructions with parents and asked participants to complete an example form during the baseline session.

Child BMI-z score

Child height and weight were measured by trained research staff using a stadiometer (model: Seca 202, Hanover, MD) and a digital weight scale (model: Tanita BWB-800P Digital Medical Scale, Arlington Heights, IL, USA) (Appendix 7.17). Three measures of both height (to the nearest 0.1 cm) and weight (to the nearest 0.1 kg) were collected at the four time points and then averaged. For measurement accuracy, children were asked to remove their shoes and change into a t-shirt and athletic shorts. BMI-z scores were generated using a SAS program created by the Centers for Disease Control and Prevention (CDC, 2016).

Statistical Analysis

Baseline comparisons for demographic and other variables between intervention and control groups were performed using independent two-sample t-tests for normally distributed continuous variables, nonparametric tests for non-normally distributed continuous variables, and Chi-square and Fisher's exact tests for categorical variables. Means and standard deviations were generated for each of the outcomes at each of the 4 time points. Comparisons of outcomes between children in the intervention versus children in the control group used mixed model regression analyses with fixed independent effects including group (intervention vs. control), time point (baseline, immediate post-course, 6 month and 12 month), and *group x time point* interaction. Mixed model regression appropriately considers repeated measures on the same subject and addresses missing data through valid estimates for all available data (Liang & Zeger, 2000). Random effects for child or course (15 total courses were held at 11 host sites) were also included to account for the variability attributable to individual child and course. Final models for vegetable intake, HEI-2010 scores, child liking of vegetables and child variety of vegetables tried were also adjusted for child gender and child age. Other covariates were considered if they had been known to be associated with the outcome. Final model co-variates for each outcome were determined using BIC criteria for best model fit. T-tests between adjusted least square means by treatment group were used to determine between-group differences at each of the four time points. T-tests between adjusted least square means at each time point were used to determine within-group changes over time. Statistical significance was set at $p < 0.05$. Data management and analyses were conducted using SAS software version 9.4 (SAS Institute Inc, 2014).

2.4 RESULTS

Attendance

A total of 103 parent/child pairs (intervention = 47, control = 54) were enrolled in the study (Figure 2.1). Five intervention parent-child pairs and 7 control parent-child pairs did not complete at least 4 cooking sessions and therefore were not eligible for the follow-up sessions (intervention = 90% retention rate, control = 87% retention rate). Families reported missing the cooking sessions because they did not have enough time to participate, obtained a new job that conflicted with weekly sessions, or their child preferred not to participate. Eighty-nine percent of the intervention group and 89% of the control group attended at least 5 of the 6 cooking skills sessions. Of the 44 intervention families eligible to attend the follow-up sessions, 36 attended the 6 month follow-up (82% retention rate) and 37 attended the 12 month follow-up (87% retention rate). Of the 47 control families eligible to attend the follow-up sessions, 45 attended both the 6 month follow-up and 12 month follow-up (96 % retention rate for both sessions).

Baseline Demographic Characteristics

The intervention families did not significantly differ from the control families in any of the baseline demographic characteristics (Table 2.1) (Appendix 7.5).

Dietary Outcome Measures

Total vegetable intake, total energy intake and HEI-2010 scores did not differ between the intervention and control children (Tables 2.2a and 2.2b). However, the intervention children consumed twice the amount of deep yellow vegetables and twice the amount of white potatoes than children in the control group at the 6-month follow-up (0.2 servings vs. 0.1 servings for both vegetable subgroups, $p = 0.048$, $p = 0.046$, respectively) (Table 2.2b). An increase was observed for the intervention group's dark green vegetable intake from immediate post-course to 12-month

follow-up (Figure 2.2: *treatment group x time* effect $p = 0.03$). Control children did not eat more dark green vegetables over time.

Other Outcome Measures

There were no significant between-group differences at any of the four time points for the measures of child BMI-z score, child liking of vegetables, and number of vegetables available at home (Table 2.3). Intervention children had tried a larger variety of vegetables compared to control children only at baseline ($p = 0.003$). Both intervention and control children increased the number of vegetables tried from immediate post-course to 12-month follow-up. Intervention children increased the number of total vegetables tried by 3 (24 to 27, $p = 0.01$) and control children increased their number tried by 4 (23 to 27, $p < 0.001$) (Figure 2.3). From baseline to 12-month follow-up, children in both intervention ($p = 0.03$) and control group ($p < 0.001$) decreased their overall liking rating across all vegetables (Figure 2.4).

2.5 DISCUSSION

Overall, behavioral strategies explained and demonstrated to parents within a parent-child cooking skills course and intended for implementation in their homes were not effective in improving the primary child outcome measures. Differences were observed between intervention and control groups for intake of only two vegetable subgroups at only one time point. There are a number of possible factors that may explain the results.

It may be possible the parents did not implement the strategies in their homes as intended by the intervention and therefore may explain the lack of intervention effect. Parents were expected to take what they learned each week in class and practice them consistently at home. Actual practice of the strategies by the parents relied on self-report. For example, the self-reported habit index (Gardner, Abraham, Lally, & de Bruijn, 2012) was collected each week

following the introduction of a new strategy and at all follow-up time points (Appendices 7.11 and 7.12). The habit index data showed strength immediately after the course for 3 of the 6 strategies with declining strength over time (not shown), which may have contributed to the lack of intervention effect. The intention-behavior gap offers support towards non-practice of the strategies by the parents in their homes (Orbell, Hodgkins, & Sheeran, 1997). During the strategy introduction segment of each session, participants expressed intention to practice the strategies. Once home, their intentions may not have translated into actually using the strategy because decisions regarding food choice are governed by more immediate reasons such as taste and convenience. Studies on similar strategies that have reported positive findings on vegetable choice and/or consumption have been set in school and other cafeteria environments allowing researchers more experimental control (Hanks, Just, & Wansink, 2013; Kubik, Lytle, Hannan, Perry, & Story, 2003; Redden et al., 2015; Reicks et al., 2012). Including a measure to capture evidence of strategy implementation could improve similarly delivered home interventions.

The number of strategies, 6 in total, may have been too many for parents to implement as intended and practice enough to realize the hypothesized cumulative effects. In addition to implementing a new strategy each week, the parents were encouraged to continue to use the previously covered strategies. As such, parents were expected to use multiple strategies while serving vegetables with meals to their children, which may have become burdensome. Cravener and colleagues (2015) focus on a single strategy in the home may have encouraged more practice of the strategy, in turn, promoting actual behavior change. Moreover, tighter budget constraints of low-income households may make changes that would improve vegetable intake less of a priority or harder to execute. (Mancino & Guthrie, 2014). For example, Serve 2 and Big Spoon may have required the purchase of more vegetables than allowed by their limited household budgets.

The results of this study are partly in line with recent work by Fulkerson et al. (2017), that also enrolled parent-child pairs testing an intervention aimed to improve aspects of home dietary environment including child vegetable intake. Both studies used a nutrition and cooking skills course format, delivered in a community setting with the expectation to implement what they learned in the course at home. Similar to the current study, Fulkerson and colleagues did not find an intervention effect on child vegetable intake, child BMI-z, and home availability of vegetables. These results considered together do not clarify if familial involvement in cooking meals at home would improve vegetable intake on associated outcomes.

Although there was no statistically significant intervention effect on the primary outcome measures, several within-group changes over time were observed. The intervention children's increase in dark green vegetable intake from immediate post-course to 12 months suggest intervention parents may have increased inclusion of these types of vegetables into meals after completion of the course. The following dark green vegetables were prepared throughout the course: broccoli (sessions 5 & 6) collard greens (session 3), and spinach (sessions 2 & 6). The increase in dark green vegetable intake among intervention children is promising considering this vegetable subgroup has been reported as one of the least consumed vegetable subgroups among this age group of children (Hiza et al., 2013; Just et al., 2007). One report estimated only 10% of children meet the dietary recommendations for dark green vegetables (Just et al., 2007). The increase in number of vegetables tried over the long-term for both groups of children is in the expected direction given the exposure to a variety of vegetables within the course for both groups. Baseline and immediate post-course data from the combined intervention and control group of this study found a significant increase for number of vegetables tried by the children (Overcash et al., 2017). These findings are encouraging for the effectiveness of Cooking Matters for Families or similar cooking and nutrition skills courses given the body of evidence that indicates increased

exposure to a variety of vegetables is a precursor to increased liking and consumption of vegetables (Lakkakula, Geaghan, Zanovec, Pierce, & Tuuri, 2010; Parizel, Laboure, Marsett-Baglieri, Fromentin, & Sulmont-Rosse, 2017; Rohlf's Domínguez et al., 2013).

The decline in overall vegetable liking for both groups of children may have prevented the hypothesized increase in vegetable intake and may be partially explained by the increase in number of vegetables tried. Participation in the nutrition and cooking skills program was expected to increase child liking of vegetables, due to increased exposure and the positive social experience paired with vegetables prepared and served in class, as posited by the evaluative conditioning theory (Birch, Zimmerman, & Hind, 1981). The behavioral strategies hypothesized to increase child liking to an even greater extent. For example, the *Child Help* strategy exemplified the positive social interaction between parent and child in preparing vegetables for the meal. *Serve 2* and *Big Spoon* strategies increased exposure to more vegetables. The increases in number of vegetables tried suggest the new vegetables tried by the children may not have been initially liked (Zajonc, 1968) and therefore lowered the overall mean liking ratings.

A search of the relevant literature shows this may be the first large-scale controlled intervention trial set in the home that tested behavioral economics-informed strategies on increasing child vegetable intake. The relatively large study population in a real-world community setting, utilization of validated data collection methods/surveys for the primary outcomes (e.g. vegetable intake, home availability), relatively low attrition, and a design grounded in Social Cognitive Theory are the main strengths of the current study. The low-income population and self-selection of participants may have compromised the generalizability of the findings. Lack of randomization of individual families into treatment groups was also a limitation. Randomization of participant families was not possible given the low numbers of

enrolled participant families at each site. As such, entire sites were designated to host entire control or intervention courses.

Conclusions

The previous success in changing dietary behavior based on application of behavioral economics-informed strategies (Hanks et al., 2013; Payne, Niculescu, Just, & Kelly, 2014; Peters et al., 2016) has strengthened the call for more behavioral economics interventions to improve nutrition choices (Interagency Committee on Human Nutrition Research, 2016). A recent commentary touted the relevancy of behavioral economics in the field of nutrition education and behavior change due to the low-to-no cost, small, unobtrusive changes of its approaches that may have cumulative effects if consistent over time (Guthrie, 2017). These types of strategies are in-line with the expansion of nutrition education from being information-oriented to focusing on what will actually affect behavior change. The findings from this study may suggest the strategies evaluated in the study may not be effective in low-income populations. Findings can also be used to improve behavioral economics-informed in-home interventions. Given the limited research on behavioral economic strategies for improving diet, more research is clearly warranted.

Figure 2.1. Study Flow Chart

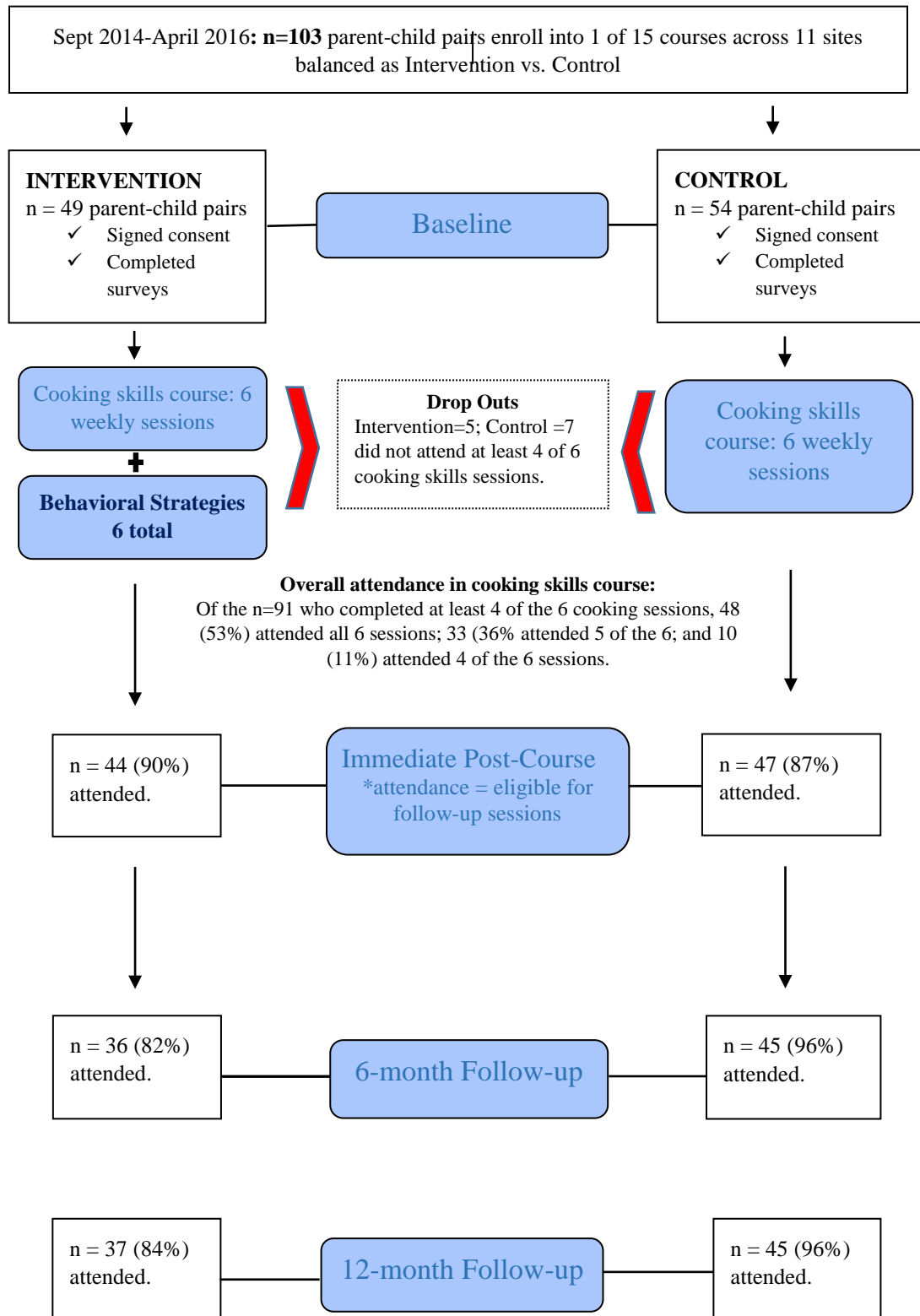


Table 2.1. Frequencies and Percentages of Baseline Parent, Household & Child Characteristics (n=103 parent-child pairs)

Characteristic	Control (n = 54) Frequency (%)	Intervention (n = 49) Frequency (%)
Parent sex		
Female	53 (98)	44(89)
Male	1 (2)	5 (10)
Parent age		
18 – 29	7 (13)	8 (16)
30 – 39	30 (57)	25 (51)
40 –60+	16 (30)	16 (33)
Parent education		
< high school diploma	10(19)	16(34)
High school diploma or GED	23(43)	9(19)
Some college/2-year degree	17(32)	19(40)
4-year college degree	4(7)	3(6)
Parent Race		
White	8(15)	7(14)
Black/African American	23(43)	13(27)
Asian/Pacific Islander/American Indian	0(0)	4(8)
Other	18(33)	21(43)
Mixed Race	5(9)	4(8)
Parent Hispanic Ethnicity	22(41)	19(39)
Household size		
≤ 3	10(19)	8(16)
4 - 5	25(46)	32(65)
6 or more	19(35)	9(18)
Food Security		
Food Secure	23(43)	15(31)
Low Food Security	16(30)	21(44)
Very Low Food Security	14(26)	12(25)
Child sex		
Female	39(72)	27(55)
Male	15(28)	22(45)
Child age		
9	20(37)	15(31)
10	20(37)	13(27)
11	8(15)	11(22)
12	6(11)	10(20)
Child race		
White	8(15)	7(14)
Black/African American	23(43)	13(27)
Asian/Pacific Islander/American Indian	0(0)	4(8)
Other	18(33)	21(43)
Mixed Race	5(9)	4(8)

Characteristic	Control (n = 54) Frequency (%)	Intervention (n = 49) Frequency (%)
Child Hispanic Ethnicity	23(43)	20(41)
Child BMI percentile category		
normal ($\geq 5 < 85$)	27(50)	26(53)
overweight ($\geq 85 < 95$)	8(15)	12(25)
obese (≥ 95)	19(35)	11(22)

Table 2.2a. Control vs. Intervention - Least Square Means of Dietary Intake Outcome Measures at Baseline and Immediate Post-Intervention

Outcome Measure	Baseline (n=103)			Immediate Post-Intervention (n=91)		
	Control LSM(SE)	Intervention LSM(SE)	t-test p-val	Control LSM(SE)	Intervention LSM(SE)	t-test p-val
Total Vegetable Servings ^{a,b}	1.6 (0.1)	1.7(0.1)	0.88	1.7(0.1)	1.5(0.1)	0.49
Total Non-Fried Vegetable Servings ^{a,c}	1.6(0.2)	1.6(0.2)	0.96	1.6(0.2)	1.3(0.2)	0.28
Dark Green Vegetable Servings ^{a,d}	0.1(0.0)	0.1(0.0)	0.99	0.2(0.0)	0.1(0.0)	0.23
Deep Yellow Vegetable Servings ^{a,d}	0.1(0.0)	0.2(0.0)	0.13	0.1(0.0)	0.2(0.0)	0.27
Tomato Servings ^{a,e}	0.5(0.1)	0.4(0.1)	0.21	0.5(0.1)	0.3(0.1)	0.09
Legume Servings ^{a,f}	0.2(0.1)	0.1(0.1)	0.20	0.1(0.1)	0.1(0.1)	0.67
White Potato Servings ^{a,d}	0.2(0.0)	0.2(0.1)	0.77	0.1(0.1)	0.1(0.1)	0.77
Total Energy (Kcal) ^g	1561.1(81.7)	1574.3(83.9)	0.91	1547.2(84.8)	1438.3(85.9)	0.37
HEI 2010 Total Score ^h	55.7(2.4)	55.8(2.4)	0.98	54.8(2.5)	56.2(2.4)	0.70
HEI 2010 Total Vegetables Component Score ^e	2.3(0.3)	2.4(0.3)	0.89	2.5(0.3)	2.3(0.3)	0.66
HEI 2010 Greens and Beans Component Score ^e	2.2(0.3)	1.7(0.3)	0.30	2.3(0.4)	1.8(0.4)	0.26

- a. Mean daily values from three 24-hour dietary recalls (Nutrition Data System for Research software version 2014, Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN).Vegetable servings are defined per the 2000 Dietary Guidelines for Americans as 1 cup of raw leafy vegetables or ½ cup of other cooked or raw vegetables. Vegetable servings are defined per the 2000 Dietary Guidelines.
- b. final model co-variates: food security status, total energy in kcal, adult education, child age and child gender
- c. final model co-variates: food security status, adult education, child age and child gender
- d. final model co-variates: child age and child gender
- e. final model co-variates: food security status, Total Energy in kcal, adult race, child age and child gender
- f. final model co-variates: food security status, child age and child gender
- g. final model co-variates: food security status, adult education, child age, adult race, child gender, household size
- h. final model co-variates: food security status, Total Energy in kcal, adult education, adult race, child gender, child race, household size, child age

Table 2.2b. Control vs. Intervention - Least Square Means of Dietary Intake Outcome Measures at 6 Mo Follow-up and 12 Mo Follow-up

<i>Outcome Measure</i>	<i>6 Mo Follow-Up (n=81)</i>			<i>12 Mo Follow-up (n=82)</i>		
	Control LSM(SE)	Intervention LSM(SE)	t-test p-val	Control LSM(SE)	Intervention LSM(SE)	t-test p-val
<i>Total Vegetable Servings^{a,b}</i>	1.8(0.1)	1.7(0.1)	0.79	1.9(0.1)	1.9(0.1)	0.64
<i>Total Non-Fried Vegetable Servings^{a,c}</i>	1.7(0.2)	1.6(0.2)	0.80	1.5(0.2)	1.7(0.2)	0.53
<i>Dark Green Vegetable Servings^{a,d}</i>	0.1(0.0)	0.1(0.1)	0.71	0.1(0.0)	0.2(0.1)	0.35
<i>Deep Yellow Vegetable Servings^{a,d}</i>	0.1(0.0)	0.2(0.1)	0.048	0.1(0.0)	0.2(0.1)	0.22
<i>Tomato Servings^{a,e}</i>	0.5(0.1)	0.4(0.1)	0.14	0.4(0.1)	0.4(0.1)	0.91
<i>Legume Servings^{a,f}</i>	0.2(0.1)	0.1(0.1)	0.16	0.2(0.1)	0.2(0.1)	0.90
<i>White Potato Servings^{a,d}</i>	0.1(0.1)	0.2(0.1)	0.046	0.2(0.1)	0.1(0.1)	0.68
<i>Total Energy (Kcal)^g</i>	1492.8(86.5)	1590.5(94.8)	0.45	1393.5(87.5)	1525.2(93.0)	0.31
<i>HEI 2010 Total Score^h</i>	57.1(2.5)	54.2(2.6)	0.44	56.3(2.5)	56.9(2.6)	0.88
<i>HEI 2010 Total Vegetables Component Score^e</i>	2.7	2.2(0.3)	0.31	2.7(0.3)	2.6(0.3)	0.86
<i>HEI 2010 Greens and Beans Component Score^e</i>	2.5(1.4)	1.4(0.4)	0.05	2.2(0.4)	2.2(0.4)	0.90

- a. Mean daily values from three 24-hour dietary recalls (Nutrition Data System for Research software version 2014, Nutrition Coordinating Center, University of Minnesota, Minneapolis, MN). Vegetable servings are defined per the 2000 Dietary Guidelines for Americans as 1 cup of raw leafy vegetables or ½ cup of other cooked or raw vegetables. Vegetable servings are defined per the 2000 Dietary Guidelines.
- b. final model co-variates: food security status, total energy in kcal, adult education, child age and child gender
- c. final model co-variates: food security status, adult education, child age and child gender
- d. final model co-variates: child age and child gender
- e. final model co-variates: food security status, Total Energy in kcal, adult race, child age and child gender
- f. final model co-variates: food security status, child age and child gender
- g. final model co-variates: food security status, adult education, child age, adult race, child gender, household size
- h. final model co-variates: food security status, Total Energy in kcal, adult education, adult race, child gender, child race, household size, child age

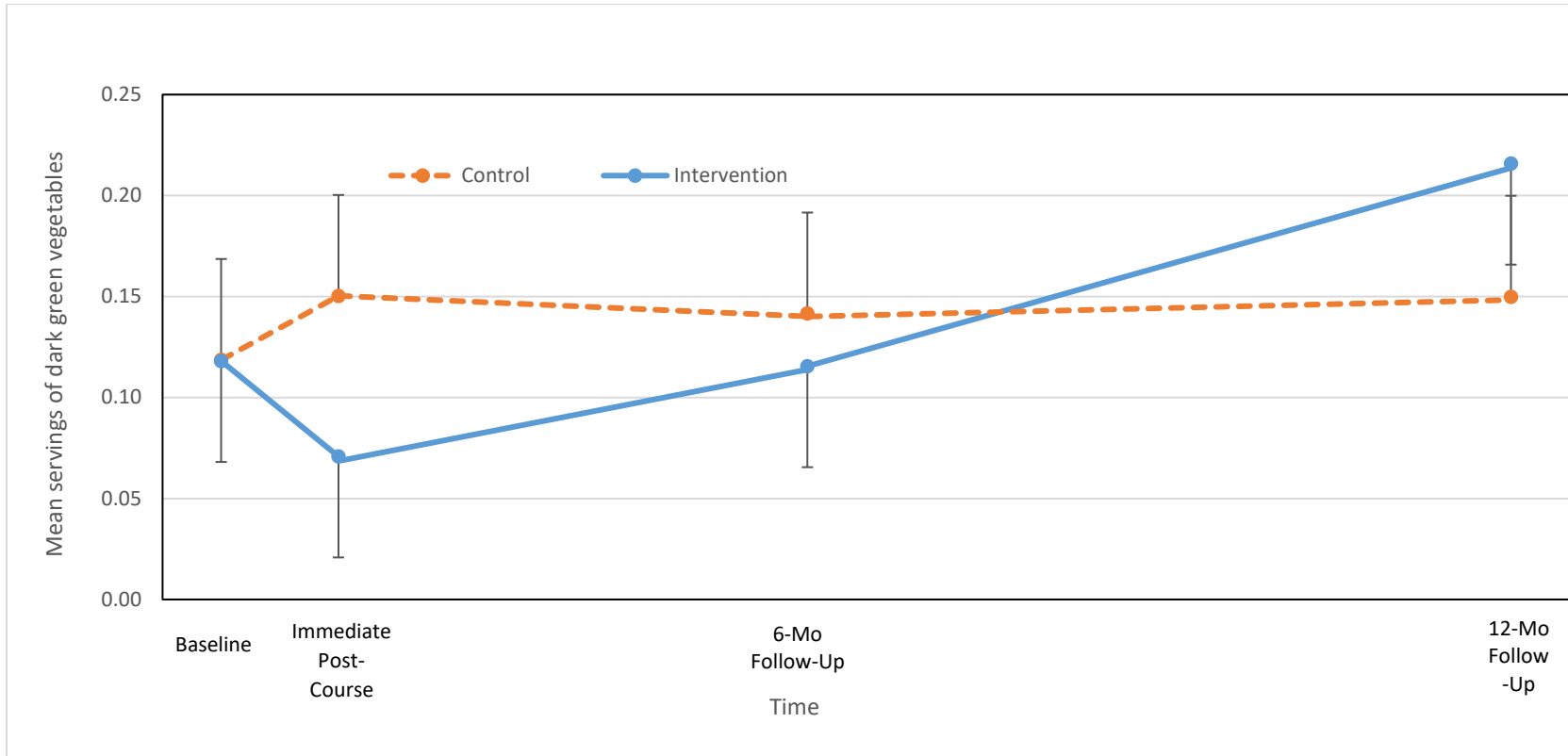


Figure 2.2. Within-group changes over time points for mean servings of dark green vegetables. One cup of raw leafy vegetables defines 1 vegetable serving defined per the 2000 Dietary Guidelines for Americans. Intervention parents were taught behavioral strategies to help increase their child’s vegetable intake. Error bars represent standard errors.

Table 2.3 Control vs. Intervention - Least Square Means of Other Outcome Measures at Baseline, Immediate Post-Intervention, 6 Mo Follow-up, and 12 Mo Follow-up

	<i>Baseline (n=103)</i>			<i>Immediate Post-Course (n=91)</i>		
	Control LSM(SE)	Intervention LSM(SE)	t-test p-val	Control LSM(SE)	Intervention LSM(SE)	t-test p-val
<i>Child BMIz score^a</i>	0.9(0.2)	0.8(0.2)	0.70	1.1(0.2)	0.9(0.2)	0.22
<i>Mean Child Liking Rating of Vegetables^{b,d}</i>	7.2(0.3)	6.6(0.3)	0.09	7.1(0.3)	6.9(0.3)	0.46
<i>Mean Number of Vegetables Tried^{b,e}</i>	20.5(0.8)	24.2(0.9)	0.003	23.1(0.9)	24.0(0.9)	0.50
<i>Mean Number of Available Vegetables at Home^c</i>	16.3(1.3)	16.4(1.2)	0.95	17.6(1.3)	17.3(1.2)	0.88

	<i>6 Mo Follow-Up (n=81)</i>			<i>12 Mo Follow-up (n=82)</i>		
	Control LSM(SE)	Intervention LSM(SE)	t-test p-val	Control LSM(SE)	Intervention LSM(SE)	t-test p-val
<i>Child BMIz score^a</i>	0.9(0.2)	0.9(0.2)	0.86	0.9(0.2)	0.9(0.2)	0.92
<i>Mean Child Liking Rating of Vegetables^{b,d}</i>	7.2(0.3)	6.8(0.3)	0.39	6.5(0.3)	6.2(0.3)	0.42
<i>Mean Number of Vegetables Tried^{b,e}</i>	23.7(0.9)	23.1(1.0)	0.63	26.7(0.9)	26.8(1.0)	0.94
<i>Mean Number of Available Vegetables at Home^c</i>	16.4(1.3)	16.7(1.3)	0.88	16.2(1.3)	18.1(1.3)	0.28

a. final model co-variates: # days active 60 min, household size, and adult education

b. final model co-variates: # of available vegetables, adult education, child age, child gender

c. final model co-variates: food security status, adult education, household size, mean # of vegetables tried by adult, mean liking rating of vegetables by adult, child age, child gender

d. liking score range: 1 = "Hate it" to 10 = "Love it"

e. measure of variety

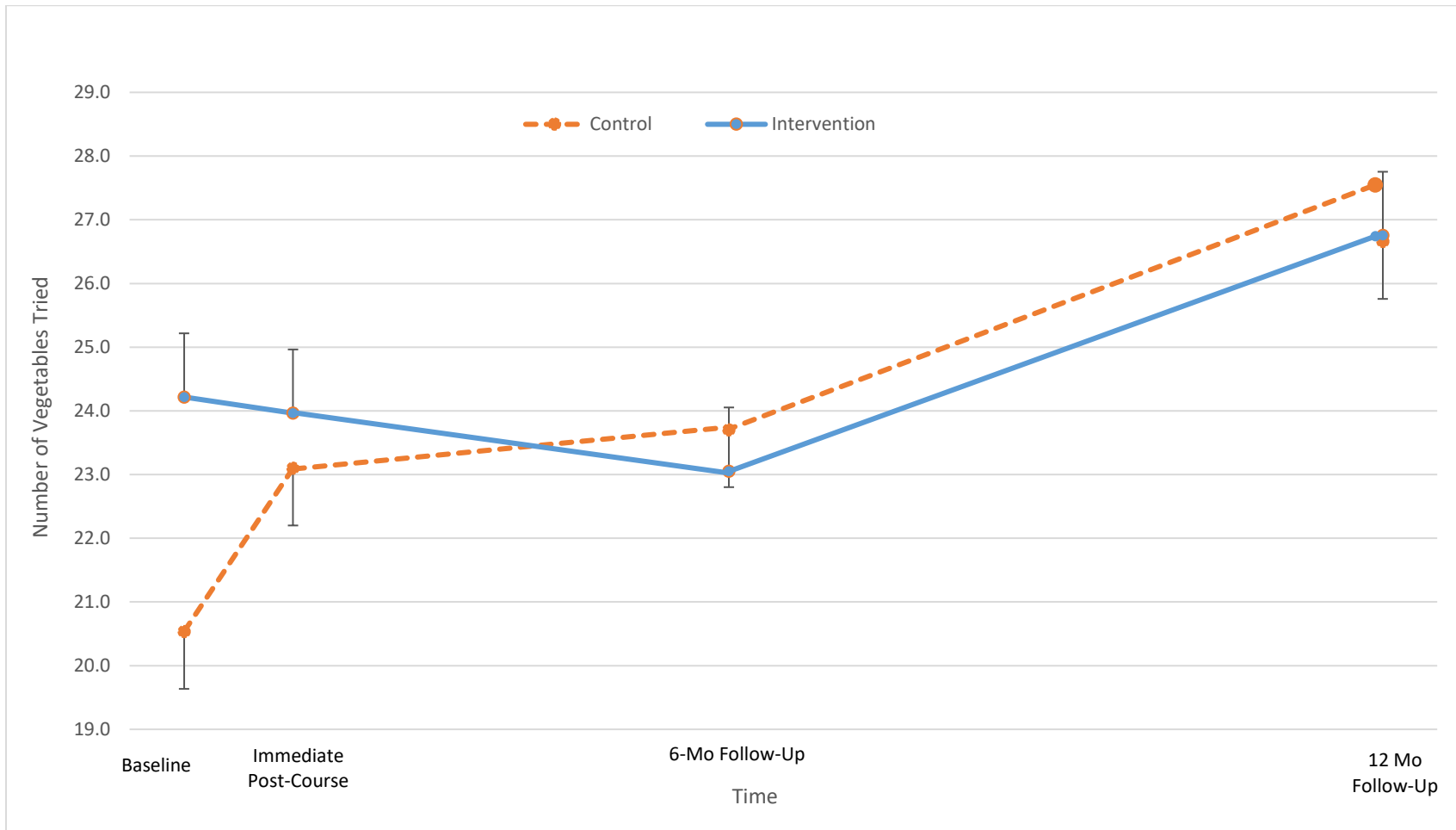


Figure 2.3. Within-group changes over time for mean number of vegetables tried (out of 37) at the four time points. Intervention parents were taught behavioral strategies to help increase their child’s vegetable intake. Error bars represent standard errors.

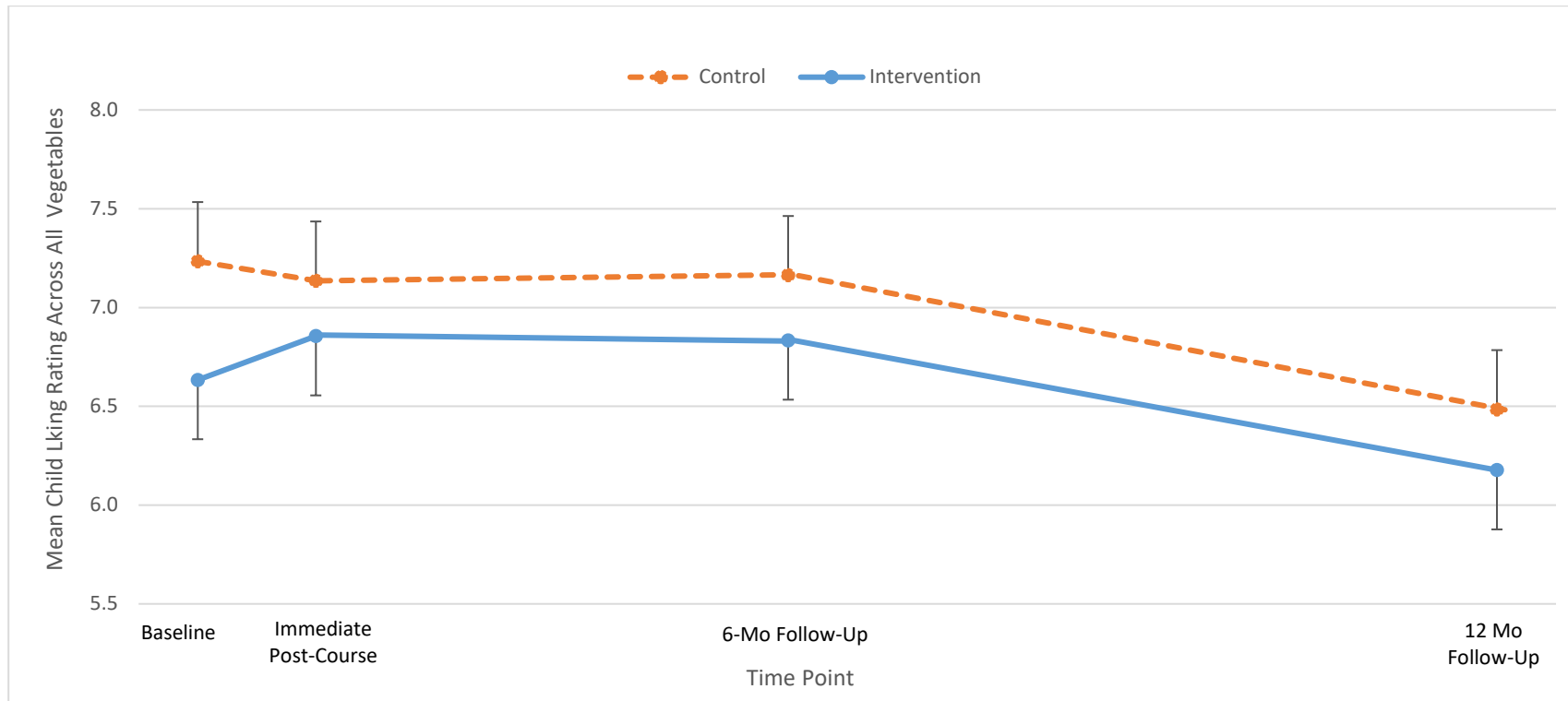


Figure 2.4. Within-group changes over time for mean child liking ratings across all vegetables. Children were asked to rate liking for 37 different vegetables. Ratings were made on a scale from 1 = “Hate it to 10 = “Love it.” Intervention parents were taught behavioral strategies to help increase their child’s vegetable intake. Error bars represent standard errors.

Chapter 3: Positive impacts of a vegetable cooking skills program among low-income parents and children

3.1 OVERVIEW

Objective: To evaluate the impact of a vegetable-focused cooking skills and nutrition program on parent and child psychosocial measures, vegetable liking, variety, and home availability.

Design: Baseline and post-course surveys, collected 1-week post-course.

Setting: Low-income communities in Minneapolis-St. Paul.

Participants: Parent-child dyads (n = 89, one-third Hispanic, African-American, White) with complete pre-post course data, flyer/email recruitment.

Intervention(s): 6, 2-hr-weekly sessions including demonstration, food preparation, nutrition education lessons, and a meal.

Main Outcome Measures: Parental cooking confidence and barriers, food preparation/resource management, child self-efficacy and cooking attitudes, vegetable liking, vegetable variety, vegetable home availability.

Analysis: Pre-post changes analyzed with paired t-test or Wilcoxon signed rank tests. Results were significant at $p < 0.05$.

Results: Increased parental cooking confidence (4.0 to 4.4/5.0), healthy food preparation (3.6 to 3.9/5.0), child self-efficacy (14.8 to 12.4, lower score = greater self-efficacy), parent liking of vegetables used in the course (7.8 to 8.1/10.0), vegetable variety (30 to 32/37 for parent, 22 to 24/37 for child), and home vegetable availability (16 to 18/35) (all $p < 0.05$).

Conclusions and Implications: A short-term evaluation of a vegetable-focused cooking and nutrition program for parents and children showed improvements in psychosocial factors, vegetable liking, variety, and home availability.

3.2 INTRODUCTION

American diets have shifted toward greater consumption of meals away from home, an increased reliance on convenience foods, (Smith et al., 2013) and a decline in cooking meals at home (United States Department of Agriculture, 2014). These trends may have contributed to the rise in obesity (Dyck et al., 2014; van der Horst et al., 2011) and poor diet quality because meals prepared from scratch at home are higher in nutritional quality and result in greater inclusion of vegetables compared to meals consumed or prepared away from home (Ayala et al., 2008; Lachat et al., 2012; Larson et al., 2006; McLaughlin et al., 2003). Because overweight and obesity are more prevalent among low-income families (Kaur et al., 2015), increasing the frequency of healthy meals prepared at home by those with limited food resources represents an important area of obesity prevention research.

Cooking skills interventions commonly target low-income participants (Fulkerson et al., 2010; Robson et al., 2016; Wrieden et al., 2007) to improve facilitators of home-cooked meals including cooking confidence, nutrition knowledge, liking of vegetables, variety of vegetables eaten, and home availability of vegetables (Chen et al., 2014; Condrasky et al., 2006; Hartmann et al., 2013; Larson et al., 2006). These measures are precursors to improved dietary intake (e.g. increased vegetable consumption), a long-term outcome resulting from behavioral change (Brug et al., 2008; Burton et al., 2017; Lally et al., 2010; Larson et al., 2007). Several studies involving low-income participants produced positive changes in these precursors. For example, Wrieden et al. (2007) conducted a 7-week cooking skills intervention study for socioeconomically-deprived adults and showed a small but positive effect on improving dietary intake and confidence in food preparation, which could lead to greater dietary change. Jamie Oliver's Ministry of Food cooking program was effective in increasing cooking confidence for adults of lower socioeconomic status

and producing positive qualitative results for food resource management (Hutchinson, Watt, Strachan, & Cade, 2016). Improvements in food purchasing behaviors and cooking attitudes were sustained 6 months after the program. A pre-test/post-test evaluation of a cooking program in low socio-economic Scottish communities showed an increase in four aspects of cooking confidence: 1) cooking using basic ingredients, 2) following a recipe, 3) tasting new foods, and 4) preparing and cooking new foods with long term improvements observed in fruit and vegetable consumption at 1-year follow-up (Garcia et al., 2014). Cooking interventions have generally been effective for increasing confidence in food preparation skills, potentially improving dietary quality and other behaviors in the long term.

More recently, cooking interventions have recruited parent and child pairs (Fulkerson et al., 2010; Robson et al., 2016). Familial participation can evoke a positive social experience and promote a sense of connectedness which may lead to increased liking of targeted foods (e.g. vegetables) as proposed by the Evaluative Conditioning Theory (Birch et al., 1981). These programs address some parents' desire for increased help from children in meal preparation (Fulkerson et al., 2011). A pilot study by Faulkner and colleagues recruited parent-child pairs for an intervention aimed at increasing the healthfulness of foods in the home and at family meals (Fulkerson et al., 2010). The families participated in 5 sessions consisting of interactive nutrition education, taste testing, building cooking skills, and hands-on meal preparation. Their intervention increased child cooking self-efficacy and child help with preparing meals. Despite promising findings, parent-child cooking skills studies have been small in-scale and limited in number (Fulkerson et al., 2010; Robson et al., 2016) thus, warranting further investigations with a family-centered approach.

Cooking Matters® is a cooking skills and nutrition program for low-income families developed by the national non-profit organization, Share Our Strength® (Share Our Strength,

2017). Grounded in Social Cognitive Theory (Bandura, 1986), Cooking Matters has been shown to improve cooking confidence, improve aspects of food resource management, and decrease healthy cooking barriers in adults (Pinard, Uvena, Quam, Smith, & Yaroch, 2015). For the current study, the Cooking Matters for Families curriculum, a version of the program where parents and children learn to cook together, was modified to focus primarily on vegetable procurement, preparation, and serving vegetables to children at mealtime. The modified Cooking Matters for Families program was delivered to 2 intervention groups, intervention group 1 and intervention group 2, as part of a longitudinal intervention study with outcomes assessed at baseline, immediate post-course, and at 6 and 12 months follow up. Parents in intervention group 2 were also asked to incorporate behavioral strategies (Leak et al., 2017) into preparing and serving dinner meals at home. Preliminary analyses showed no between-group differences for outcome measurements (i.e. child vegetable intake and associated factors) from baseline to immediate post-course. Therefore, data from intervention group 1 and intervention group 2 were combined for this report. The purpose of the following study was to evaluate the immediate impact of the vegetable-focused cooking skills program on parent and child psychosocial measures, vegetable liking, variety of vegetables eaten, and home availability of vegetables by utilizing data collected at baseline and immediate post-course from the combined intervention group 1 and intervention group 2 participants.

3.3 METHODS

Participants

Parent/child pairs were recruited through flyers/email from 11 sites (3 were Spanish-only) serving low-income families (Appendix 7.1). Sites included subsidized housing, schools, churches, and community centers in the Minneapolis/St. Paul metropolitan area. Eligibility criteria included: 1) the participant child was 9-12 years old; 2) the parent was the household's

main food preparer; 3) the family qualified for public assistance; 4) had a phone; 5) had not participated in Cooking Matters for Families in the past 3 years; and 6) read, spoke and understood English (or Spanish for Spanish-only sites) (Appendix 7.2). The University of Minnesota Institutional Review Board approved the study (Appendices 7.3 and 7.4).

Implementation of the Vegetable-focused Cooking Skills Program

The learning objectives of the 6 original Cooking Matters for Families sessions were revised to address procuring vegetables, using various vegetable preparation methods, and incorporating vegetables into meals and dishes (Table 3.6). The 6, 2-hour cooking skills and nutrition education sessions had the following format: 1) a professional chef demonstrated a vegetable-focused recipe 2) parent/child pairs prepared the recipe under the guidance of the chef and nutrition educator, 3) a nutrition educator delivered a nutrition education lesson, and 4) participants ate the meal they prepared together. Chefs and nutrition educators participated in training sessions to ensure consistent delivery of the program. Families were given a bag of groceries that included all the ingredients needed to prepare the meal at home.

Fifteen weekly courses across 11 different host sites were held between September 2014 - June 2016, totaling 90 cooking/nutrition education sessions. A total of 103 parent-child pairs enrolled in the study. Twelve families did not complete immediate post-course data because they did not attend at least 4 cooking skills/nutrition sessions and two families had missing data so were excluded from analysis. Of the remaining 89 families, 11% attended 4 sessions, 36% attended 5 sessions, and 53% attended 6 sessions. Parents and children were given \$40 and \$20 in cash, respectively, after participating in the pre and post data collection sessions.

Evaluation of the Program

Participants completed the same surveys at baseline and immediate post-course to assess changes in psychosocial measures, vegetable liking, variety of vegetables eaten, and home vegetable availability (Appendices 7.6 – 7.16). Surveys were completed both on paper and iPads[®] via QuickTapSurvey[®]. Study staff were trained to use a standardized protocol for survey collection that included administering a brief tutorial on completion of iPad surveys. Parents and children were compensated for completed paper work at the data collection sessions.

Demographic Characteristics

Parents answered questions about age, sex, education level, food security, household size, and child demographic information (Appendix 7.5).

Psychosocial Measures

Parents completed the Cooking Matters for Families Before and After Course Survey to assess changes in the following parental psychosocial outcomes: cooking confidence, healthy food preparation, cooking barriers, and food resource management (Table 3.7). Internal consistency and ability of the scales to reflect positive self-reported changes were previously established by Pinard et al., among low-income adults (cooking confidence $\alpha = 0.86$, healthy food preparation $\alpha = 0.70$, cooking barriers $\alpha = 0.88$) (Pinard et al., 2015). Response options for the items in the scales were: cooking confidence (4 items, 1 = not at all confident - 5 = very confident), healthy food preparation (8 items, 1 = never - 5 = always), and cooking barriers (3 items, 1 = strongly disagree - 5 strongly agree). Means were calculated for each of the three scales. Food resource management was assessed by 3 individual items on 5-point scales: (1 = never - 5 = always).

Cooking confidence was further evaluated by asking parents if they had ever prepared each of 29 different vegetables and if they had used each of 10 different vegetable preparation

methods (Appendix 7.8). Cooking confidence regarding the individual vegetables and cooking methods previously prepared and used, respectively, was assessed by asking parents to rate their confidence on a scale from 1 = not at all sure - 5 = extremely sure (Winkler & Turrell, 2009). Child self-efficacy and attitudes toward cooking were measured using scales that have shown internal consistency and test-retest reliability in a psychometric evaluation of a cooking-based nutrition education intervention among low-income 9-11 year old children (Cronbach $\alpha \geq 0.74$, test-retest $r \geq 0.66$) (Lohse, Cunningham-Sabo, Walters, & Stacey, 2011) (Appendix 7.15). Child self-efficacy and attitudes toward cooking scales were summed for an overall total score: (8 items, 1 = YES! - 5 = NO!) and (6 items, 1 = “I really like...”- 5 = “I really don’t like . . .”), respectively. A lower score indicated greater self-efficacy and more positive attitudes toward cooking. Parents also completed the 10-item short form Marlowe-Crowne Social Desirability Scale (Ballard, 1992) (Appendix 7.9).

Liking and Variety of Vegetables

Both children and parents were asked if they had ever tried each of 37 vegetables (Appendices 7.6 and 7.14). If they answered ‘yes’, they were also asked to rate their liking of the vegetable on a 10-point labeled hedonic scale (1 = “Hate it,” 5 = “It’s okay,” 10 = “Love it”). Variety was calculated by summing the number of vegetables for which the respondent answered “yes” to the “ever had” question. Participants were given colored pictures depicting all vegetables listed in the same order (alphabetical) as in the survey for a visual aid.

Home Availability of Vegetables

Parents completed a validated Home Food Inventory developed to self-report availability of 35 vegetables currently in their home (Fulkerson et al., 2008) (Appendices 7.7 and 7.13). Vegetables were listed in separate rows in a checklist format with “yes/no” response options with

3 columns per row: fresh, can/jar, frozen. Research staff reviewed the instructions and helped participants to complete an example form during the baseline session.

Data Analysis

Frequencies and corresponding percentages were calculated for sociodemographic and household characteristics.

Preliminary analyses were conducted to determine whether immediate changes from pre- to post-course differed between intervention group 1 and intervention group 2 for the primary outcomes (psychosocial measures, vegetable liking, variety of vegetables eaten, and home availability of vegetables) using analyses of variance. Dependent variables were the primary outcomes. Independent variables were group, time, and participant. No significant differences were observed between groups. Therefore, further analyses considered all participants as a single group.

To compare pre- and post- course psychosocial measures, paired t-tests were conducted on normally distributed means and Wilcoxon signed-rank tests were conducted on ordinal and non-normally distributed variables. For parent confidence for cooking individual vegetables and for use of specific vegetable cooking methods, the 6 possible responses were dichotomized into 2 levels. The lower level included the responses “Never Cooked/Prepared,” “Not at all sure,” “Slightly Sure” and “Somewhat Sure.” The higher level included the responses “Very Sure” and “Extremely Sure. Frequencies and percentages at both time points were generated and assessed using McNemar’s test on the binary variables. Means and standard deviations for the number of vegetables and the number of cooking methods of vegetables that were rated “Very Sure” or “Extremely Sure at pre- and post-test were also calculated.

Parent and child liking were assessed by mean liking ratings across all 37 vegetables, the 20 vegetables prepared in the course, and the 17 vegetables not prepared in the course. To measure variety of vegetables, a mean number of vegetables tried by parent and child were generated separately. To measure home availability, a mean number of vegetables reported to be present in the home (in at least 1 of the 3 forms: fresh, canned/jarred or frozen) was calculated. The change between pre- and post-course responses was tested using the appropriate test (paired t-test or Wilcoxon signed-rank).

SAS (version 9.4, SAS Institute, Inc., Cary, NC) was used for all statistical analyses. Statistical significance was set at $p \leq 0.05$. Bonferroni-Holm corrections were applied to account for multiple-testing.

3.4 RESULTS

Most parents were female (96%), in the 30-39 year age range, and had a high school diploma or GED as the highest level of education (Table 3.1). For race, the largest group of parents self-reported their race as “Other” (40%). Forty one percent indicated they were of Hispanic ethnicity. The majority of households were categorized as low or very low food secure. Parents had a mean score of 6.6 (SD 1.6) on the 10-item short form Marlowe-Crowne Social Desirability Scale (Ballard, 1992). There were more female (62%) than male child participants (38%). The racial distribution of the children mirrored that of parents, with most children reporting “Other” (41%) (Table 3.1).

Overall, parent cooking confidence ($p < 0.0001$) and healthy food preparation skills ($p < 0.0001$) improved with an increase in the scaled scores from pre- to post-course (Table 3.2). There was no significant difference for parent-reported barriers or for any food resource

management skills between pre- and post-course. Child self-efficacy improved ($p < 0.0001$), but there was no improvement for child attitudes toward cooking ($p = 0.28$).

Overall, the mean number of vegetables parents felt confident (Very Sure/Extremely Sure) preparing increased from pre- to post-course (16.5 to 19.6) ($p < 0.0001$) (Table 3.3). Parents reported increased confidence in preparing 5 vegetables/vegetable types prepared during the course: avocado, bean sprouts, peas, root vegetables, and zucchini (all $p \leq 0.04$). Of those vegetables, zucchini and root vegetables showed the greatest percentage increases from pre- to post-course. The mean number of vegetable cooking methods parents felt confident in using increased from 5.0 to 6.4 at post-course ($p < 0.0001$) (Table 3.4). Parents reported increased confidence in using 4 individual vegetable cooking methods: poaching, roasting, stir-frying, and stewing/braising with stir-frying showing the greatest percentage increase from pre-course (51%) to post-course (73%) (all $p < 0.05$).

Vegetable liking, vegetable variety, and home availability of vegetables generally increased from pre- to post-course (Table 3.5). Parent liking ratings across the 20 vegetables prepared in the course significantly increased ($p = 0.01$); the children's liking did not. The number of vegetables tried improved from pre- to post-course for both parents ($p = 0.0005$) and children ($p = 0.04$). The number of available vegetables present in the home significantly increased from 16.1 at baseline to 17.9 after completion of the course ($p = 0.03$).

3.5 DISCUSSION

A number of reasons may help explain why this family-focused program improved psychosocial measures, especially cooking confidence, for both parents and children. The demonstrations and hands-on participation increased exposure to preparation methods and

allowed for practice, likely leading to familiarity, skills and ultimately confidence (Fulkerson et al., 2010; Jarpe-Ratner et al., 2016). The increase in parent cooking confidence is especially encouraging given the high baseline mean rating of 4.0 (out of 5). The improved cooking self-efficacy for children is promising because previous studies of children and adolescents show that food and nutrition-related self-efficacy is associated with healthful food choices and dietary behavior (Larson et al., 2006; Lotrean & Tutui, 2015; Wind et al., 2006).

To the authors' knowledge, the current study is the first to assess pre- to post-course changes in confidence for cooking individual vegetables and for vegetable cooking methods. The increases in confidence for cooking individual vegetables and for using cooking methods may be attributable to the high number of different vegetables incorporated into the recipes and to the repeated use of 5 of the vegetable-cooking methods throughout the course. Zucchini was the most prepared vegetable (in 3 of 6 recipes). Parents had the largest increase in cooking confidence for zucchini, indicating that the selection of vegetables is important in cooking skills programs. The possibility of social desirability may also partly explain the improvements in confidence. The parent mean score of 6.5 (SD 1.6) on the Marlowe-Crowne Social Desirability Scale was higher than previous studies among university students using the same scale (Ballard, 1992), suggesting a tendency for positive response bias.

Evaluative Conditioning Theory (De Houwer, Thomas, & Baeyens, 2001) may explain why parental liking ratings of the vegetables used in the course increased (Table 4). Individual liking ratings of 37 different vegetables were also collected (not shown). Of the 6 vegetables that increased in parental liking from pre- to post-course, 5 were prepared in the course. The increase in liking may have resulted from the pairing of the positive social interactions (parent, child, nutrition educator, study staff, and chef) during the classes with the vegetables. Birch and colleagues found that a positive social interaction with a friendly adult paired with consuming a

snack food increased a child's preference for that food versus the same food presented non-socially (Birch et al., 1981). Improving parental liking of vegetables may be a positive step towards increased exposure of children to vegetables because parents likely role model eating vegetables they like, which could lead to eventual, positive effects on child intake (Draxten et al., 2014).

The increases in number of vegetables tried by parents and children, which is indicative of vegetable variety, and the increase in the home availability of vegetables may have been due to the comprehensive approach of the program. For example, the importance of vegetable variety was addressed in several sessions (e.g. MyPlate and fresh, frozen and canned forms of vegetables) that included interactive activities and games. Experiential learning activities that exposed participants to a variety of vegetables may have improved attitudes toward tasting and eating vegetables (Bevan, Vitale, & Wengreen, 2012; Robinson-O'Brien, Story, & Heim, 2009; Wang et al., 2010). Vegetable preparation was not only a learning-to-prepare activity but also increased exposure to the vegetables, which would be expected to increase liking (Zajonc, 1968). Topics promoting home availability of vegetables (e.g. seasonality of vegetables, shopping smart for vegetables, etc.) also spanned several sessions. Vegetables provided at the end of class gave participants additional experience with the vegetables and may have increased the likelihood of purchasing the vegetables in the future. These findings are especially promising given that previous research has shown that increases in both variety of vegetables (Parizel et al., 2017; Roe et al., 2013) and home availability of vegetables (Cook et al., 2014) increased vegetable consumption.

This study had several limitations and strengths. As with most cooking skills programs, self-selection bias was likely. Those interested in cooking or in improving their diet may have been more motivated to enroll. Thus the generalizability of study findings may be limited to

similar individuals. Social desirability bias in reporting may have also resulted, given the self-reported format of the surveys (Rees, Hinds, Dickson, O'Mara-Eves, & Thomas, 2012). However, because nutrition educators delivered the intervention during the cooking skills sessions and other research staff administered the surveys, the risk for this bias may have been partially mitigated. Because baseline and immediate post-course data were combined from both intervention group 1 and intervention group 2, an intervention effect may have contributed to the results described here. However, the preliminary analyses showed no difference between groups for any of the outcomes. Another limitation is that only determinants of eating behavior were reported. Longer term effects on actual eating behavior can be reported after longitudinal data have been collected and analyzed. The pre-post evaluation design is a major limitation in that findings may be attributable to factors other than the cooking skills program. Lastly, lack of significant findings may have been the result of low power. Strengths are that this study evaluated a cooking program focused primarily on the procurement and preparation of vegetables for low-income participants and that parents and children participated together.

3.6 IMPLICATIONS FOR RESEARCH AND PRACTICE

A vegetable-focused cooking-skills program where parents and children learn together is worthy of further implementation and investigation as findings from the current study showed a positive impact on psychosocial measures, vegetable liking, vegetable variety, and home availability of vegetables. Decisions regarding the variety of vegetables to include within these types of programs may be informed by conducting further research to determine if a program that incorporates only the most nutrient dense vegetables (e.g. dark green variety) would be more effective versus a program that focuses on all vegetables. Determining what instructional objectives and activities of the program had the greatest impact on cooking confidence, vegetable

liking, vegetable variety, and home availability should be examined through qualitative measures. The findings from this study support the need for practitioners to include cooking demonstrations and hands-on food preparation activities when the goal is to improve familiarity with vegetables and confidence in preparing vegetables. If these intermediate outcomes are positively affected, other outcomes such as vegetable liking, variety, and home availability may also be improved. If the goal is to improve these outcomes for children, parent involvement is recommended.

Table 3.1. Baseline Parent & Child Characteristics (n = 89)

Characteristic	n (%) ¹
Parent sex	
Female	85 (96)
Male	4 (4)
Parent age	
18 – 29	12 (14)
30 – 39	47 (53)
40 –60+	29 (33)
Parent education	
< High School Diploma	23 (26)
High School Diploma or GED	30 (34)
Some College/2-year Degree	29 (33)
4-year College Degree	5 (6)
Parent Race	
White	14 (16)
Black/African American	30 (34)
Asian/Pacific Islander/American Indian	4 (5)
Other	35 (40)
Mixed Race	5 (5)
Parent Hispanic Ethnicity	36 (41)
Household size	
≤ 3	15 (17)
4 - 5	49 (55)
6 or more	25 (28)
Food Security	
Food Secure	34 (39)
Considered Low Food Secure	31 (36)
Considered Very Low Food Secure	22 (25)
Parental Social Desirability Scale	Mean (SD)
	6.5 (1.6)
Characteristic	n (%)
Child sex	
Female	55 (62)
Male	34 (38)
Child age (years)	
9	31 (35)
10	30 (34)
11	16 (18)
12	12 (14)

Characteristic	n (%) ¹
Child race	
White	11 (12)
Black/African American	30 (34)
Asian/Pacific Islander/American Indian	4 (4)
Other	36 (41)
Mixed Race	8 (9)
Child Hispanic Ethnicity	38 (43)

¹Where n ≠ 89, data are missing

Table 3.2. Pre- and Post-Course Psychosocial Scaled Measures for Parents and Children¹ (n = 89 parent-child pairs)

<i>Measure</i>	Pre-Course	Post-Course	<i>p</i> -value
	Mean (SD)	Mean (SD)	
<i>Parent Cooking Confidence Scale</i>	4.0 (1.0)	4.4 (0.7)	<.0001
<i>Healthy Food Preparation Scale</i>	3.6 (0.6)	3.9 (0.6)	<.0001
<i>Barriers Scale</i>	2.3 (1.0)	2.2 (1.0)	0.54
<i>Parent Food Resource Management²</i>			
<i>How often do you compare prices before you buy food?</i>	4.0 (1.2)	3.9 (1.2)	0.69
<i>How often do you plan meals ahead of time?</i>	3.6 (1.1)	3.9 (0.9)	0.69
<i>How often do you use a grocery list when you shop?</i>	3.2 (1.4)	3.5 (1.3)	0.69
<i>Child Self-Efficacy Scale</i>	14.8 (5.3)	12.4 (4.0)	<.0001
<i>Child Attitude Towards Cooking Scale</i>	9.5 (3.4)	9.1 (3.0)	0.28

¹Paired t-tests when data were normally distributed, Wilcoxon signed-rank tests when data were not normally distributed.

²Scoring scale: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Always;

Table 3.3. Pre- and Post- Course Frequencies of Parents Who Reported "Very Sure" or "Extremely Sure" to Confidence in Cooking Specific Vegetables (n = 89)

<i>Measure How confident are you in preparing/cooking...</i>	Pre-Course n (%)	Post-Course n (%)	<i>p-value</i> ³
<i>Asparagus</i>	32 (36)	45 (51)	0.11
<i>Avocado</i> ¹	48 (54)	63 (71)	0.01
<i>Bean Sprouts</i>	10 (11)	25 (28)	0.01
<i>Beans</i> ¹	61 (69)	72 (81)	0.27
<i>Broccoli/Cauliflower</i> ¹	72 (81)	81 (91)	0.62
<i>Brussel Sprouts</i>	19 (21)	27 (30)	1.00
<i>Cabbage</i>	59 (66)	69 (78)	1.00
<i>Celery</i> ¹	61 (69)	73 (82)	0.26
<i>Corn</i> ¹	78 (88)	81 (91)	1.00
<i>Cucumber</i> ¹	68 (76)	76 (85)	1.00
<i>Edamame</i>	10 (11)	18 (20)	1.00
<i>Green Beans</i> ¹	66 (74)	77 (87)	0.62
<i>Hot Pepper</i> ¹	56 (63)	58 (65)	1.00
<i>Jicama</i>	28 (31)	34 (38)	1.00
<i>Leafy Greens</i> ¹ (e.g. spinach, kale, etc)	58 (65)	65 (73)	1.00
<i>Lettuce</i> ¹	74 (83)	81 (91)	1.00
<i>Mixed Vegetables</i>	76 (85)	82 (92)	1.00
<i>Mushrooms</i>	39 (44)	47 (53)	1.00
<i>Okra</i>	22 (25)	28 (31)	1.00
<i>Onion</i> ¹	77 (87)	79 (89)	1.00
<i>Peas</i> ¹	56 (63)	73 (82)	0.04
<i>Pepper</i> ¹	65 (73)	77 (87)	0.45
<i>Plantain</i>	35 (39)	39 (44)	1.00
<i>Potato</i>	77 (87)	82 (92)	1.00
<i>Root Vegetable</i> (eg, radish, yucca, etc) ¹	39 (44)	60 (67)	0.02
<i>Squash</i>	38 (43)	49 (55)	0.17
<i>Sweet Potato</i> ¹	39 (44)	51 (57)	0.45
<i>Tomato</i> ¹	70 (79)	78 (88)	1.00
<i>Zucchini</i> ¹	35 (39)	58 (65)	0.003
<i>Mean Number (SD) Vegetables Rated "Very Sure" or "Extremely Sure" in Cooking/Preparing</i>	16.5 (7.0)	19.6 (6.0)	<.0001 ⁴

Table 3.4. Pre- and Post- Course Frequencies of Parents Who Reported "Very Sure" or "Extremely Sure" to Confidence in Cooking Methods of Vegetables (n = 89)

<i>Measure</i>	Pre-Course n (%)	Post-Course n (%)	<i>p-value</i> ³
<i>How confident are you in preparing /cooking...</i>			
<i>Boiling</i> ²	59 (66)	70 (79)	0.26
<i>Steaming</i> ²	68 (76)	74 (83)	0.57
<i>Shallow Frying</i> ²	37 (42)	48 (54)	0.40
<i>Deep Frying</i>	28 (31)	35 (39)	0.57
<i>Grilling</i>	52 (58)	62 (70)	0.40
<i>Poaching</i>	18 (20)	35 (39)	0.02
<i>Roasting</i> ²	54 (61)	70 (79)	0.04
<i>Stir Frying</i> ²	45 (51)	65 (73)	0.01
<i>Microwaving</i>	43 (48)	50 (56)	0.57
<i>Stewing/Braising</i>	41 (46)	57 (64)	0.05
<i>Mean Number (SD) Cooking Techniques for Vegetables rated "Very Sure" or "Extremely Sure"</i>	5.0 (3.3)	6.4 (2.8)	0.0001 ⁴

¹Prepared/eaten in course

²Method demonstrated/practiced in course

³McNemar's test

⁴Paired t-test

**Table 3.5. Pre- and Post-Course Liking and Variety and Home Availability of Vegetables for Parents and Children¹
(n = 89 parent-child pairs)**

	Parent			Child		
	Pre-Course Mean (SD)	Post-Course Mean (SD)	<i>p</i> -value	Pre-Course Mean (SD)	Post-Course Mean (SD)	<i>p</i> -value
Mean Liking Rating Score Across ALL Vegetables ¹	6.8 (1.6)	7.0 (1.5)	0.12	6.9 (1.4)	6.9 (1.2)	1.00
Mean Liking Rating Score Across 20 Vegetables Prepared/Eaten in Course ²	7.8 (1.3)	8.1 (1.3)	0.01	7.0 (1.5)	7.1 (1.3)	1.00
Mean Liking Rating Score Across 17 Vegetables Not Prepared/Eaten in Course ²	5.5 (2.1)	5.6 (2.0)	0.68	7.0 (1.9)	6.6 (1.6)	0.15
Mean Number of Vegetables Tried ³	29.5 (5.1)	31.7 (4.7)	0.0005	22.4 (5.7)	23.9 (5.3)	0.04
Mean Number of Available Vegetables Present in Home	16.1 (5.7)	17.9 (5.4)	0.03			

¹Paired t-tests when data were normally distributed, Wilcoxon signed-rank tests when data were not normally distributed.

²Liking Score Range 1 = "Hate it" to 10 = "Love it"

³Measure of variety

Table 3.6. Original and Revised Cooking Matters for Families Session Objectives with Applicable Activities, Related Outcomes, and Behavior Change Techniques

<i>Original Cooking Matters for Families</i>	<i>Revised Cooking Matters for Families focusing on vegetables</i>	<i>Activities</i>	<i>Related Outcomes</i>	<i>Behavior Change Technique^E</i>
<p>1. Cooking Side-by-Side</p> <ul style="list-style-type: none"> Practice classifying foods into MyPlate food groups; Discuss safe, age-appropriate tasks for kids in the kitchen; Practice using knives safely; Discuss strategies to share more meals together. 	<p>1. Cooking Side-by-Side</p> <ul style="list-style-type: none"> Identify age-appropriate tasks for kids in the kitchen; (Recipes were notated with child friendly tasks. Knife skills were at the discretion of parent—visual aid that depicted kid-friendly, chef discussed) Perform kitchen safety practices including handling knives safely; Identify pros and cons of using different forms of vegetables; Include a variety of vegetables in meals; Identify community resources for vegetables; List strategies to share more meals together. Foods prepared: Turkey Tacos with beans, corn, spinach, tomatoes, zucchini, carrots Vegetable cooking methods used: shallow-frying, stir-frying 	<p>Knife skills^A</p> <p>Measuring skills^A</p> <p>Identify age appropriate tasks for children to help with meals^A</p> <p>Present/discuss community resources for vegetables</p> <p>Show/discuss all forms of vegetables and importance of varying by color</p> <p>Shallow-frying/Stir-Frying</p> <p>Eating meal that families helped prepare^A</p>	<p>Self-Efficacy^B/Confidence^C</p> <p>Self-Efficacy^B/ Attitude Towards Cooking^B /Cooking Barriers^C</p> <p>Food Resource Mgmt^C/Healthy Food Prep Skills^C/Home Availability^D</p> <p>Healthy Food Prep Skills^C/Confidence^C/ Self-Efficacy^B/ Attitude Towards Cooking^B</p> <p>Self-Efficacy^B/Confidence/ Attitude/Vegetable Liking & Variety^{B, C}/ Attitude Towards Cooking^B</p>	<p>Instruction on how to perform a behavior/Modelling of the behavior/Practice</p> <p>Goal setting/Verbal persuasion to boost self-efficacy/Social support</p> <p>Action planning including implementation intention/Pros and Cons</p> <p>Instruction on how to perform a behavior/Modelling of the behavior/Practice</p> <p>Social support /Self-reward</p>

<i>Original Cooking Matters for Families</i>	<i>Revised Cooking Matters for Families focusing on vegetables</i>	<i>Activities</i>	<i>Related Outcomes</i>	<i>Behavior Change Technique^E</i>
<p>2. Try It, You'll Like It</p> <ul style="list-style-type: none"> • Discuss ways to help kids develop good eating habits; • Discuss the pros and cons of using different forms of fruits and vegetables; • Practice identifying whole grain foods by reading label ingredient lists; • Discuss ways to include more fruits, vegetables and whole grains into family meals. 	<p>2. MyPlate</p> <ul style="list-style-type: none"> • Classify foods into MyPlate food groups; • Determine proportion of the plate food groups should fill; • Explain why it is important to eat foods from every food group • List different ways to cook vegetables; • Include vegetables in every lunch/dinner meal • Foods prepared: Baked Flaked Chicken and Collard Greens, • Cooking methods: used: shallow-frying, stir-frying 	<p>Discuss importance of and appropriate proportions of food groups</p> <p>Discuss different cooking methods of vegetables</p> <p>Shallow-frying/Stir-Frying/Baking</p>	<p>Food Resource Mgmt^C/Healthy Food Prep Skills^C/Home Availability^D</p> <p>Food Resource Mgmt^C/Healthy Food Prep Skills^C/Cooking Barriers^C</p> <p>Healthy Food Prep Skills^C/Confidence^C/Self-Efficacy^B/Attitude Towards Cooking^B</p>	<p>Action planning including implementation intention/Pros and Cons/Health Consequences</p> <p>Action planning including implementation intention/Pros and Cons</p> <p>Instruction on how to perform a behavior/Modelling of the behavior/Practice</p>
<p>3. Healthy Starts at Home</p> <ul style="list-style-type: none"> • Practice reading food labels; • Practice identifying healthy snacks that include at least two food groups; • Practice identifying healthier choices when eating away from home; <ul style="list-style-type: none"> ○ Prepare healthier versions of popular convenience foods. 	<p>3. Food Labels and Healthy Choices</p> <ul style="list-style-type: none"> • Use food labels to identify healthier options; • Identify healthy snacks that include foods from at least two food groups (including the vegetable group); • Add vegetables to popular convenience foods to improve healthfulness. • Foods prepared: Salmon-Pasta Bake with Green Peas and Orange-Glazed Carrots • Cooking methods used: baking, boiling, stewing 	<p>Discuss and practice how to read food labels</p> <p>Brainstorm ideas for 2-food group/vegetable-based snacks</p> <p>Discuss popular convenience foods and easy ways to make them healthier</p> <p>Baking/Boiling/Stewing</p>	<p>Food Resource Mgmt^C/Healthy Food Prep Skills^C/Confidence^C/Vegetable Liking & Variety^B</p> <p>Food Resource Mgmt^C/Healthy Food Prep Skills^C/Confidence^C/Cooking Barriers^C/Vegetable Liking and Variety</p> <p>Healthy Food Prep Skills^C/Confidence^C/Self-Efficacy^B</p>	<p>Instruction on how to perform a behavior/Practice/Pros/Health consequences</p> <p>Action planning including implementation intention/Pros/Health Consequences</p> <p>Instruction on how to perform a behavior/Modelling of the behavior</p>

<i>Original Cooking Matters for Families</i>	<i>Revised Cooking Matters for Families focusing on vegetables</i>	<i>Activities</i>	<i>Related Outcomes</i>	<i>Behavior Change Technique^E</i>
<p>4. The Power of Planning</p> <ul style="list-style-type: none"> Practice planning a family meal using strategies learned in class; Discuss strategies to eat breakfast every day; Discuss ways to save time when making meals at home; Practice making simple recipe changes. 	<p>4. The Power of Planning</p> <ul style="list-style-type: none"> Plan family meals according to MyPlate; Use practices to save time when making meals at home; Make simple recipe changes to add vegetables; Keep kitchen stocked with vegetables to enable creation of quick and healthy meals. Foods prepared: Chinese Vegetable Stir-Fry (zucchini, , broccoli, celery, carrots, hot pepper) and Steamed Green Beans Cooking methods used: stir-frying, steaming 	<p>Discuss the benefits of meal planning/time saving</p> <p>Discuss staple items to keep on hand in home to make cooking vegetables easier/more convenient</p> <p>Stir-fry/Steaming</p>	<p>Food Resource Mgmt^C/Healthy Food Prep Skills^C/Confidence^C/Cooking Barriers^C/Vegetable Liking and Variety</p> <p>Healthy Food Prep Skills^C/Confidence^C/Self-Efficacy^B</p>	<p>Instruction on how to perform a behavior/Modelling of the behavior/Goal setting/Prompt cues</p> <p>Action planning including implementation intention/Pros and Cons/Goal setting/Restructuring the physical environment</p> <p>Instruction on how to perform a behavior/Modelling of the behavior/Practice</p>
<p>5. Active Families</p> <ul style="list-style-type: none"> Discuss physical activities that can be done as a family; Taste and describe a variety of healthy beverages; Discuss the benefits of choosing low-fat dairy foods. 	<p>5. Shopping Smart for Vegetables</p> <ul style="list-style-type: none"> Identify benefits of shopping smart for vegetables; Use appropriate methods to stretch food dollars when shopping for or storing vegetables; Use appropriate storage and preparation methods for specific vegetables to reduce waste; Use different forms of veggies to optimize savings. Foods prepared: Veggie Wrap (radishes, carrots, leafy greens, cucumber, beans, corn, avocado) with cherry tomatoes and cauliflower 	<p>Discuss best practices and benefits when shopping for vegetables</p> <p>Discuss shelf-life of variety of vegetables and when to tell when vegetables go bad</p> <p>Discuss cost savings of using in-season produce</p>	<p>Food Resource Mgmt^C/Healthy Food Prep Skills^C/Confidence^C</p> <p>Home Availability^D</p>	<p>Action planning including implementation intention/Pros and Cons/Health Consequences</p> <p>Pros/Cons/Problem solving/Planning</p> <p>Material reward (more \$ to spend on other necessities)</p>

<i>Original Cooking Matters for Families</i>	<i>Revised Cooking Matters for Families focusing on vegetables</i>	<i>Activities</i>	<i>Related Outcomes</i>	<i>Behavior Change Technique^E</i>
6. Celebrating Our Success <ul style="list-style-type: none"> Review principles of making smart food choices, planning and preparing meals together and maximizing food resources; Celebrate success in planning and preparing healthy meals as a family; Set goals as a family to continue using these lessons after the course ends. 	6. Celebrating Our Success <ul style="list-style-type: none"> Prepare an entree including a secret vegetable ingredient using cooking skills acquired over the past 5 sessions; Prepare roasted vegetables; Recall concepts as a family team to increase vegetable consumption based on meal planning, label reading, shopping for, and preparing vegetables. Foods prepared: Tuna Melts with water chestnuts, green pepper, red onion or zucchini, and Roasted Vegetables (sweet potato, zucchini, carrot, onion, tomatoes, broccoli) Cooking cooking methods used: baking, roasting 	<ul style="list-style-type: none"> Trivia game reviewing vegetable preparation/procurement/serving Roasting/Baking 	<ul style="list-style-type: none"> Food Resource Mgmt^C/Healthy Food Prep Skills^C/Confidence^C Healthy Food Prep Skills^C/Confidence^C/Self-Efficacy^B/Attitude towards cooking^B 	<ul style="list-style-type: none"> Social support/Social reward/Problem solving Instruction on how to perform a behavior/Modelling of the behavior/Practice

^A Applies to all 6 Sessions

^B Child outcome

^C Parent outcome

^D Environmental outcome

^EMichie S, Wood C, Johnston M, Abraham C, Francis J, Hardeman, W. Behaviour change techniques: the development and evaluation of a taxonomic method for reporting and describing behaviour change interventions. *Health technology assessment*. 2015;19(99):1-188.

Table 3.7. Pre- and Post-Course Scaled Items Under Parent Reported Confidence, Healthy Food Preparation Skills, and Cooking Barriers and Child Reported Self-Efficacy and Attitudes Toward Cooking Scale (n = 89 parent-child pairs)

<i>Measure</i>	Pre-Course	Post-Course	<i>p-value</i> ⁶
	Mean (SD)	Mean (SD)	
<i>PARENT Cooking Confidence</i> ¹			
<i>How confident are you that you can use basic cooking skills (i.e., cutting f/v, measuring ingredients)?</i>	4.0 (1.2)	4.6 (0.7)	0.01
<i>How confident are you that you can buy healthy foods on a budget?</i>	3.8 (1.2)	4.2 (1.0)	0.09
<i>How confident are you that you can cook healthy foods for your family on a budget?</i>	3.9 (1.1)	4.2 (0.9)	0.09
<i>How confident are you that you can help your family eat more healthy?</i>	4.2 (1.0)	4.7 (0.6)	0.01
<i>PARENT Healthy Food Preparation Skills</i> ²			
<i>How often do you read "nutrition facts" food label?</i>	2.9 (1.4)	3.5 (1.1)	0.01
<i>How often do you eat breakfast within two hours of waking up?</i>	3.2 (1.2)	3.6 (1.2)	0.16
<i>How often do you eat food from each food group every day?</i>	3.6 (1.1)	4.0 (1.0)	0.06
<i>How often do you make homemade meals from scratch?</i>	4.1 (1.0)	4.1 (0.9)	1.00
<i>How often do you adjust meals to include ingredients that are budget friendly?</i>	3.4 (1.1)	3.6 (1.0)	1.00
<i>How often do you adjust meals to be more healthy (i.e., add vegetables, use whole grain, bake instead of fry)?</i>	3.8 (0.9)	3.9 (0.9)	1.00
<i>How confident are you that you can use the same healthy ingredient in more than one meal?</i>	4.0 (0.9)	4.3 (0.9)	0.06
<i>How confident are you that you can choose the best-priced form of fruits and vegetables (fresh, frozen, or canned)?</i>	4.0 (1.0)	4.3 (0.9)	0.05
<i>PARENT Cooking Barriers</i> ³			
<i>Cooking takes too much time.</i>	2.4 (1.2)	2.4 (1.2)	1.00
<i>Cooking is frustrating.</i>	2.1 (1.1)	2.0 (1.0)	1.00
<i>It is too much work to cook.</i>	2.2 (1.2)	2.2 (1.1)	1.00
<i>CHILD Self-Efficacy</i> ⁴			
<i>I can make a snack with fruit</i>	1.5 (0.9)	1.4 (0.9)	0.47
<i>I can make a snack with vegetables</i>	2.2 (1.2)	1.8 (1.1)	0.07

<i>Measure</i>	<i>Pre-Course Mean (SD)</i>	<i>Post-Course Mean (SD)</i>	<i>p- value⁶</i>
<i>With help, I can use a recipe</i>	1.8 (1.1)	1.5 (0.7)	0.47
<i>I can help my family make a meal</i>	1.7 (1.0)	1.4 (0.7)	0.19
<i>I can make a salad</i>	1.8 (1.2)	1.5 (0.9)	0.47
<i>I can cut up food</i>	1.9 (1.3)	1.3 (0.7)	0.00
<i>I can measure ingredients</i>	2.3 (1.3)	2.0 (1.2)	0.29
<i>I can follow recipe directions</i>	1.8 (1.0)	1.6 (1.0)	0.29
<i>CHILD Attitudes Toward Cooking⁵</i>			
<i>How do you feel about cooking?</i>	1.4 (0.7)	1.3 (0.6)	1.00
<i>How do you feel about foods that you have helped cook?</i>	1.3 (0.6)	1.3 (0.6)	1.00
<i>How do you feel about measuring ingredients?</i>	2.2 (1.3)	2.1 (1.2)	1.00
<i>How do you feel about making snacks?</i>	1.5 (0.9)	1.3 (0.6)	0.83
<i>How do you feel about making food with your friends?</i>	1.8 (1.2)	1.8 (1.2)	1.00
<i>How do you feel about making food with your family?</i>	1.3 (0.7)	1.3 (0.7)	1.00

¹Scoring scale: 1 = Not at all confident; 2 = Not very confident; 3 = Neutral; 4 = Somewhat confident; 5 = Very confident

²Scoring scale: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Always;

³Scoring scale: 1 = Strongly Disagree; 2 = Disagree; 3 = Neither Agree nor Disagree; 4 = Agree; 5 = Strongly Agree

⁴Scoring scale: 1 = YES!; 2 = Yes; 3 = Not sure; 4 = No; 5 = NO!;

⁵Scoring scale: 1 = "I really like ..."; 2 = "I kind of like..."; 3 = "I'm not sure if..."; 4 = "I don't like..."; 5 = "I really don't like...";

⁶Bonferroni-Holm correction applied to p values

**Chapter 4: Children find a variety of vegetables acceptable:
Vegetable liking and acceptability from racially and ethnically
diverse low-income children**

4.1 OVERVIEW

Vegetable intake by children falls far below the minimum recommended levels. Understanding which vegetables children find acceptable may be beneficial for those responsible for providing vegetables to children to improve intake. The objective of this study was to measure vegetable liking for a wide variety of vegetables by a racially and ethnically diverse population of 9-12 year old low-income children. The majority of children were female and aged 9-10 years. The largest proportion of children were Black/African American (38%) followed by Other (28%) which included Hispanic ethnicity, and White (19%). Using surveys from 149 children (ages 9 – 12 years), mean liking ratings were calculated for 35 different vegetables. A 10-point hedonic rating scale was used (1-Hate it to 10-Love it). The number of children that found each vegetable acceptable and unacceptable was also tabulated. Mean liking over all 35 vegetables suggested of a general acceptance of all vegetables. Corn was the most liked vegetable, closely followed by potatoes, lettuce, and carrots. Artichoke had the lowest mean liking, followed by onion and beets. For 34 of the 35 vegetables, more than 50% of children who tried them, considered them acceptable. These findings may be helpful to multiple audiences including researchers, parents, school feeding programs and the food industry.

4.2 INTRODUCTION

Less than 10% of all children meet the minimum recommendations for vegetable intake (NCI, 2015). Acceptability and liking of vegetables are some of the most important precursors of intake (Wadhera et al., 2015). Improving acceptability and liking may increase intake of vegetables by children and result in health benefits (Slavin & Lloyd, 2012). The understanding that children eat what they like and avoid what they dislike (Birch, 1998) underscores the importance of information regarding the variety of vegetables children find acceptable and like.

Earlier research (1950's) regarding children's liking of vegetables showed children generally accepted a variety of vegetables once they tried them. Hunt and colleagues' (1958) investigated acceptance of a variety of vegetables among fourth grade students. They surveyed 28 students to determine if they had tried 15 different vegetables. If they had tried the vegetable, they were asked to rate their liking of each one. The same survey was administered 2 years later. The results showed that the more a vegetable was tried, the more it was liked. For example, at baseline, over 82% of the children reported having never tasted broccoli and only 18% of children who had tasted it reported liking it "very much." Likewise, 89% of the children never tasted rutabaga and only 7% of children who had tasted it, reported liking it "very much." At the follow-up time-point 2 years later, both broccoli and rutabaga had been tasted by more of the children with fewer children who had never tasted each vegetable (4% and 12%, respectively). Dramatic increases in liking resulted: 81% of children who tasted broccoli and 65% who tasted rutabaga reported liking it "very much." At the close of the study, over 80% of the children who had tried 7 of the 15 vegetables surveyed (broccoli, cabbage, peas, lettuce, green beans, carrots, and corn) reported liking them "very much" (Hunt et al., 1958).

Many researchers have claimed vegetables are the least liked food group among children with some types (dark green) liked less than others (Chu et al., 2013; Gibson et al., 1998; Pérez-

Rodrigo et al., 2003; Wardle et al., 2003, 2001; Zeinstra et al., 2007). Cooke and Wardle (2005) examined the development of food preferences in children to determine the best and least liked foods. Results from 1,291 4-16 year old British children who completed a 115-item food preference questionnaire showed that 6 of the 10 least liked foods were vegetables (spinach, leeks, green squash, rutabaga, sprouts, and turnip). High fat/sugary foods and fruit were the most well-liked foods. Patton and Carver (1958) examined preference for food groups during school lunch. They used the amount of plate waste as a measure of preference for specific food groups. They found plate waste from vegetables was greater than plate waste from protein-rich foods and from fruit/fruit dessert.

Studies examining child liking of vegetables have cited bitter taste, low-calorie density, and inadequate exposure as major contributing factors to a child's dislike of a vegetable. Humans are predisposed to reject bitter taste (Birch, 1999), partly as self-protection because natural poisons are bitter-tasting (Glendinning, 1994). As a result, the bitter taste of vegetables may contribute to their rejection by children. However, Dinehart and colleagues (2006) showed that bitter taste was not a strong predictor of vegetable preference (semi-partial correlation coefficient = -0.22, $p = 0.01$). Gibson and Wardle (2003) investigated whether energy-dense vegetables were more preferred over less energy-dense vegetables. They surveyed 416 mothers of 4-5 year olds about their children's food likes and dislikes. They found energy density was a significant predictor of vegetable liking. The "mere exposure effect" (Zajonc, 1968) explains how increased exposure leads to increased liking. This principle postulates that the more children are exposed to vegetables, the more familiar the vegetables become, and ultimately liking is increased. Repeated exposure to vegetables has increased child liking of vegetables in many studies (Anzman-Frasca, Savage, Marini, Fisher, & Birch, 2012; Garcion, Wion-Barbot, Montero-Menei, Berger, & Wion,

2002; Hunt et al., 1958; Maier, Chabanet, Schaal, Issanchou, & Leathwood, 2007; Mennella et al., 2008; Wardle et al., 2003).

The limited number of studies that have reported liking/preference of individual vegetables among children have found that some are commonly liked and others are commonly disliked. Chu and colleagues (2013) conducted a study to determine the association between liking ratings of specific vegetables and their intake among Canadian children. Liking of 5 vegetables (carrots, broccoli, green beans, tomatoes, spinach) were rated using a 3-point scale (like a lot, like a bit, don't like) by 3,398 Canadian children, aged 10-11 years. They found that carrots were the most liked vegetable (56% of children liked it a lot; 94% children found it acceptable). Spinach was the least liked vegetable (23% of children liked it a lot; 51% of children found it acceptable). Perez and colleagues (2003) measured likes and dislikes of foods and examined their association to food pattern preferences among Spanish children. They administered a population-based survey among a random sample of 3,534 children and young adults, aged 2-24 years. Participants were asked to rank their 3 favorite vegetables within a group of 7 vegetables (artichoke, cauliflower, spinach, asparagus, carrots, lettuce, and tomato). They reported tomato and lettuce as the most preferred vegetables. Corn has been identified as one of the most familiar and most liked vegetables (Bevan et al., 2016; Domel et al., 1993; Hunt et al., 1958). Whereas Brussels sprouts, spinach, and beets have been suggested as some of the least liked (Capaldi-Phillips & Wadhera, 2014; Cooke & Wardle, 2005; Hunt et al., 1958). These studies had limitations. A relatively limited number of vegetables were included in the studies by Chu et al., and Perez-Rodrigo et al., respectively. The greatest proportion of children in the study by Chu et al. (2013) resided in households with an income greater than \$100,000 (Canadian dollar) compared to households with an income \$50,000 to \$100,000 and households with an income less than \$50,000. The Perez et al. study of a solely Spanish population may not be

generalizable to a more diverse population like the United States. Other studies that used a more extensive list of vegetables were conducted among a small group of children (Hunt et al., 1958).

The objective of this study was to measure vegetable liking and acceptability for a wide variety of vegetables by a racially and ethnically diverse population of 9-12 year old low-income children. Because liking is a consistent determinant of vegetable intake for children (Bere & Klepp, 2005; Blanchette & Brug, 2005; Hunt et al., 1958), information on liking of specific vegetables can inform the design of studies (e.g. broaden number of vegetables tested) that aim to increase variety and consumption in more vulnerable populations (Daniel, 2016). In addition, parents may find the results useful in choosing vegetables that their children may like. Vegetable liking data of preadolescent children may be useful to parents of this age group who still want to help guide their children's vegetable choices. Children of this age group have been found to exert more independence in making food choice decisions compared to younger children (Thornburg, 1983).

4.3 METHODS

Participants

A total of 149 children (ages 9 – 12 years), combined from 2 in-home intervention studies (46 from the first study; 103 from the second study) participated (Leak et al., 2015; Overcash et al., 2017). For both studies, parent-child pairs were recruited primarily through flyer/email campaigns directed at low-income families in the Minneapolis-St. Paul metropolitan area from 2014-2016. Eligibility criteria included: 1) the child must be 9-12 years old, 2) the family must qualify for some form of public assistance and 3) the child must be able to read, speak, and understand English. The majority of children (62%) were female and aged 9-10 years (65%). The largest proportion of children were Black/African American (38%) followed by Other (28%)

which included Hispanic ethnicity, and White (19%). Parents and children were paid for participation. The University of Minnesota Institutional Review Board approved the study.

Procedure

Children were asked to rate their liking of a variety of vegetables common among the different racial and ethnic groups of the study population. The first and second study asked children to rate 36 and 37 different vegetables, respectively. The liking rating scale was comprised of values across a 10-point labeled hedonic scale (1 -“Hate it” to 5 - “It’s okay” to 10 - “Love it”). For both studies, iPad® surveys (QuickTapSurvey®, www.quicktapsurvey.com) were used to collect child liking ratings. The first 3 questions of the survey were example questions to help ensure the child understood how to use the slide rating scale. The slide rating scale required the child to touch a slider on the scale and move it to their rating on the scale. Staff guided the children through these example questions that asked “Think of a food you love,” “Think of a food you hate,” and “Think of a food that you think is just okay.” After each example question, they asked the children to practice touching the slider on the scale to the appropriate location on the scale. When the example questions were completed to the satisfaction of the staff, the child proceeded with the questions about the specific vegetables.

The question “Have you ever tried (name of vegetable)” was first asked for each vegetable. If the child touched ‘yes,’ the next screen asked the child to rate their liking of the vegetable by sliding a finger across the scale. If they touched ‘no,’ the next screen asked about “ever trying” the next vegetable. A handout with colored pictures of all the vegetables presented in the same order (alphabetical) as in the survey was provided as a visual aid. The research team estimated that completion time for the child liking surveys ranged from 4 to 9 minutes.

Children were asked to rate their liking of 2 categories of beans: 1) black beans and 2) other beans (bean dishes, kidney, lentil, hummus) in the first study and 1 category in the second

study (black, bean dishes, kidney, lentil, hummus). In the second study, children were asked to rate 2 categories of squash: 1) squash (e.g. acorn, butternut)/pumpkin and 2) zucchini/other yellow summer squashes, whereas in the first study they rated liking of only 1 squash category (butternut, zucchini). In the second study, children rated liking of 2 categories of peppers: 1) peppers (e.g. red, orange, green) and 2) hot peppers (e.g. chilies), whereas in the first study they rated liking of 1 pepper category (red, orange, green, hot). Weighted averages were computed to combine the 2 categories of beans in the first study and the 2 categories of squash and of peppers in the second study. A total of 35 vegetables were in the final dataset (Table 4.1).

Data Analysis

Mean liking ratings, standard errors, and confidence intervals for each vegetable were calculated. The number of children that found each vegetable acceptable and unacceptable was tabulated. A rating greater than or equal to 5 indicated the child found the vegetable acceptable. Whereas a rating less than 5 indicated the child found the vegetable unacceptable. The percentage of children who found the vegetable acceptable was calculated using the total number of children who found the vegetable to be acceptable divided by the total number of children who ever tried the vegetable. SAS® software (Statistical Analysis System, Version 9.4, 2017, Cary, NC, USA) was used to analyze the data.

4.4 RESULTS

Mean liking ratings for all 35 individual vegetables are presented in order from most liked to least liked (Table 4.1, Figure 4.1). Corn was the most liked vegetable with a mean liking rating of 9.1. Liking of potatoes, lettuce, and carrots closely followed liking of corn (all means \geq 8.2). Artichoke had the lowest mean liking (4.6), followed by onion (4.9), and beets (4.9). These

three vegetables were the only vegetables that had mean liking below 5. Mean liking across all 35 vegetables was 6.9.

For 34 of the 35 vegetables, more than 50% of children who tried them, considered them acceptable (Table 4.1, Figure 4.2). Artichoke was the only vegetable where less than 50% of children who tried it, considered it acceptable. Corn, potato, lettuce, carrots, and vegetable soup were the 5 vegetables where more than 90% of children who tried them, considered them acceptable. Of the 19 children who had ever tried bamboo shoots, 79% found them acceptable. Onion and okra were two vegetables where the percentage of children who found them acceptable was almost equal to the percentage who found them unacceptable. However, onion was a much more tried vegetable among the children compared to okra (88% vs. 15% respectively) (Table 4.1).

4.5 DISCUSSION

The current study reinforced the belief that children find a variety of vegetables acceptable. Only 3 (of 35) vegetables (artichoke, onions, and beets) had a mean liking rating less than 5, indicative of unacceptability. Moreover, artichoke was the only vegetable where less than 50% of the children who had ever tried it rated it unacceptable. Thus, the majority of vegetables were found to be acceptable to the majority of children who had tried them.

The results of this study are in agreement with previous work (Hunt et al., 1958) where the most tried vegetables were also the most liked vegetables. Corn, potato, lettuce, carrots, and tomato were the most liked (highest mean liking) and also the most tried (more than 93% of children had tried them). Hunt and colleagues (1958) most liked vegetables were carrots (100% Like Very Much), green beans (100% Like Very Much), corn (96% Like Very Much), lettuce (96% Like Very Much), and cabbage (96% Like Very Much). Carrots, green beans, and corn were also the most tried with 0% of children reporting “Never tasted” them. Lettuce and cabbage

were close behind with only 4% of children having checked “Never tasted” for both vegetables, respectively (Hunt et al., 1958). Hunt and colleagues also found that for 8 (of 15) vegetables that had been tried by the children, 50 -100% of the children surveyed, checked “Like very much”. At the final time point 2 years later, the number of vegetables liked “very much” by over 50% of the children increased to 10 (of 15) (Hunt et al., 1958). A more recent study on vegetable acceptance/liking of individual vegetables (Chu et al., 2013) did not report the number of children who had ever tried (or never tried) each vegetable. The association between the most tried vegetables being the most liked vegetables may suggest once the children tried the vegetable, they were willing to continue eating it at subsequent opportunities. Therefore, increased exposure to the vegetable may have led to greater familiarity and in turn, improved liking as proposed by the “mere exposure” theory (Zajonc, 1968).

On the other hand, not all of the most tried vegetables were also the most liked. To illustrate, onion was tried by 88% of the children. Yet, it was the 2nd least liked vegetable. A recent study (Bevan et al., 2016) measured the association between familiarity and liking of 11 vegetables. They found cauliflower was familiar to almost 100% of the children but was one of the least liked vegetables (mean liking = 3.5, ranked 8th of the 11 vegetables). The findings for both these vegetables suggest these vegetables may be commonly found in dishes prepared for children, yet children may not find them palatable. For example, onion is often found in its raw form as a topping to popular foods among children like hamburgers and hot dogs. Children may not have liked the taste of raw onions and used this version of the vegetable to rate its overall liking.

Our most liked vegetables (e.g. carrots, corn, potato, lettuce, tomatoes) were in agreement with vegetable liking rankings in previous studies (Chu et al., 2013; Hunt et al., 1958; Pérez-Rodrigo et al., 2003). This finding was unsurprising for a number of reasons. The prevalence of

corn, lettuce and tomato in dishes across different cultures equates wide-spread familiarity (Kuczmarski, Kuczmarski, & Najjar, 1995; Tucker, Bianchi, Maras, & Bermudez, 1998). Corn is a starchy, energy-dense vegetable (~19g carbohydrates per 100g of corn), commonly found for purchase in its most sweet form (United States Department of Agriculture, 2016). Likewise, carrots are considered one of the more sweet vegetables. Consumption data of corn and potatoes among children appears to coincide with their high liking ratings. These starchy vegetables have previously been reported as the leading type of vegetables consumed by children (Hiza et al., 2013; Lorson et al., 2009). In the current study, 3 of the 9 most liked vegetables were of the red/orange and dark green vegetable subgroups (carrot, tomato, and broccoli). Numerous articles have reported that dark green and red/orange vegetables are the least consumed (Banfield, Liu, Davis, Chang, & Frazier-Wood, 2016; Hiza et al., 2013), yet the data from the current study shows some of these vegetables are well-liked. Parents may not be aware that children actually like these types of vegetables and therefore may not incorporate them into meals. As a result, opportunities for children to consume these vegetables are reduced.

Information on the wide variety of vegetables children find acceptable may be of interest to multiple audiences. This information may broaden the selection of vegetables for research interventions that promote vegetable consumption. Results may also be of interest to parents for meal preparation at home, the setting where children consume about 2/3 of their daily calories (Poti & Popkin, 2011). Gaining knowledge of the variety of vegetables children have reported they like may inspire parents to include more types of vegetables they prepare for their children. Because liking of foods is a major factor in product development, the food industry may reference the findings to broaden the types and amounts of vegetables formulated into their products, especially those developed for children.

Limitations

Although the participants were racially and ethnically diverse, the total number was smaller compared to population-based studies that have measured liking of individual vegetables (Chu et al., 2013; Pérez-Rodrigo et al., 2003). The parent-child pairs self-selected into their respective nutrition-related studies and therefore may have already had sufficient exposure to healthier foods like vegetables to elicit greater liking.

Conclusions

Corn, lettuce, carrot, tomato, and potato continue to be the most liked and most tried vegetables among children. The results from the current study offered evidence that children found a wide variety of vegetables acceptable.

Table 4.1. Summary of child liking data (n=149)

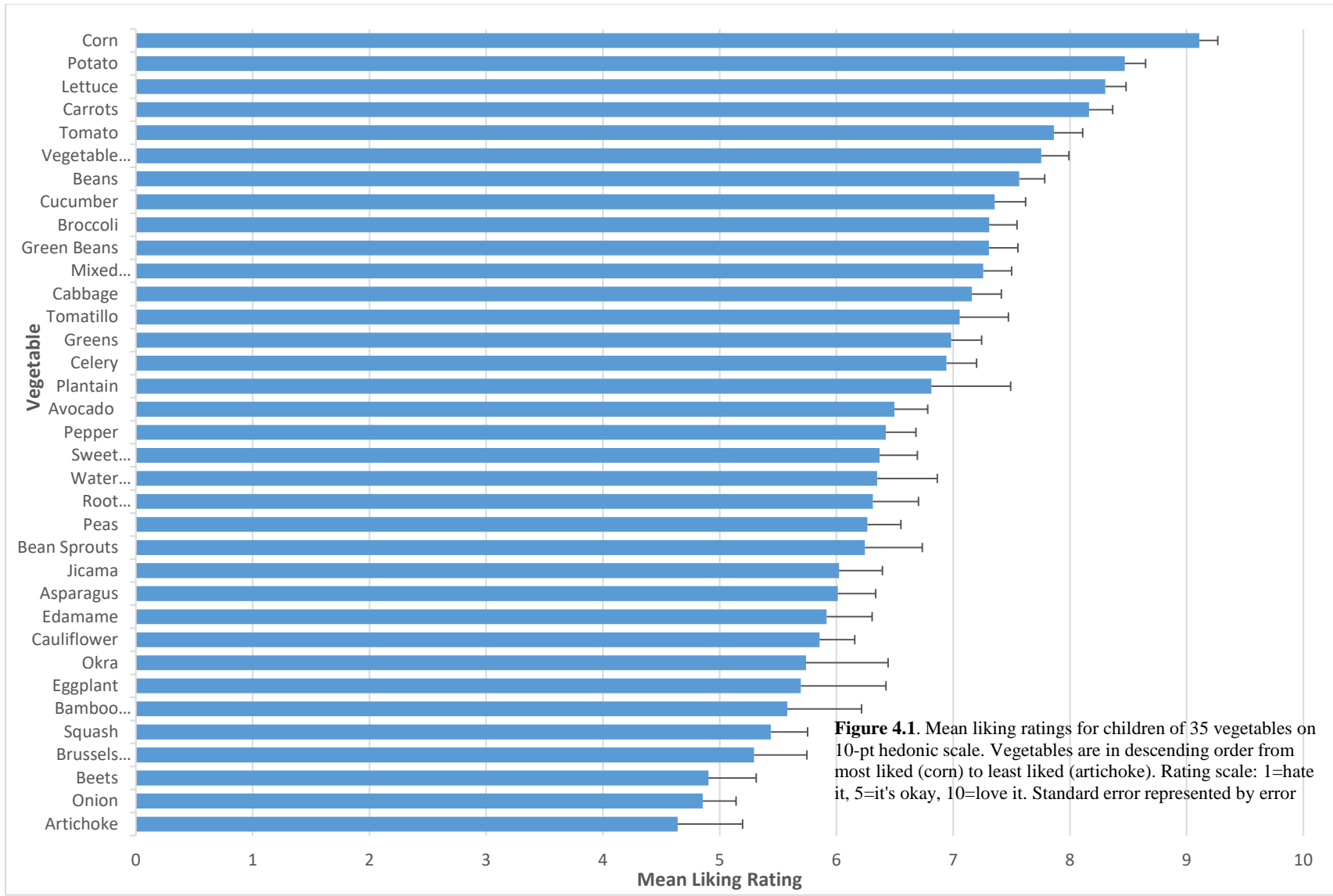
<i>Vegetable</i>	Mean ¹ (SE)	# of children who found vegetable unacceptable ²	# of children who found vegetable acceptable ³	Total # of children who ever tried vegetable	% of children who found vegetable acceptable ⁴
<i>Corn</i>	9.1 (0.2)	5	142	147	97
<i>Potato</i>	8.5 (0.2)	7	140	147	95
<i>Lettuce</i>	8.3 (0.2)	5	140	145	97
<i>Carrots</i>	8.2 (0.2)	11	136	147	93
<i>Tomato</i>	7.9 (0.2)	18	121	139	87
<i>Vegetable Soup</i>	7.8 (0.2)	9	105	114	92
<i>Beans</i>	7.6 (0.2)	17	118	135	87
<i>Cucumber</i>	7.4 (0.3)	24	111	135	82
<i>Broccoli</i>	7.3 (0.2)	19	124	143	87
<i>Green Beans</i>	7.3 (0.2)	21	106	127	83
<i>Mixed</i>	7.3 (0.2)	19	113	132	86
<i>Vegetables</i>					
<i>Cabbage</i>	7.2 (0.3)	22	97	119	82
<i>Tomatillo</i>	7.1 (0.4)	5	31	36	86
<i>Greens</i>	7.0 (0.3)	24	93	117	79
<i>Celery</i>	6.9 (0.3)	29	109	138	79
<i>Plantain</i>	6.8 (0.7)	11	21	32	66
<i>Avocado</i>	6.5 (0.3)	27	86	113	76
<i>Pepper</i>	6.4 (0.3)	31	94	125	75
<i>Sweet</i>	6.4 (0.3)	37	79	116	68
<i>Potato/Yam</i>					
<i>Water</i>	6.3 (0.5)	14	29	43	67
<i>Chestnuts</i>					
<i>Root Vegetable</i>	6.3 (0.4)	10	38	48	79
<i>Peas</i>	6.3 (0.3)	41	91	132	69
<i>Bean Sprouts</i>	6.2 (0.5)	10	27	37	73
<i>Jicama</i>	6.0 (0.4)	35	56	91	62
<i>Asparagus</i>	6.0 (0.3)	25	59	84	70
<i>Edamame</i>	5.9 (0.4)	21	39	60	65
<i>Cauliflower</i>	5.9 (0.3)	39	78	117	67
<i>Okra</i>	5.7 (0.7)	11	12	23	52
<i>Eggplant</i>	5.7 (0.7)	10	13	23	57
<i>Bamboo Shoots</i>	5.6 (0.6)	4	15	19	79
<i>Squash</i>	5.4 (0.3)	34	55	89	62
<i>Brussel Sprouts</i>	5.3 (0.5)	28	33	61	54
<i>Beets</i>	4.9 (0.4)	28	34	62	55
<i>Onion</i>	4.9 (0.3)	64	67	131	51
<i>Artichoke</i>	4.6 (0.6)	13	12	25	48
<i>Average Mean Liking</i>	6.9 (0.05)				

¹ Ratings were made on a scale from 1 = “Hate it to 10 = “Love it.”

² unacceptable = mean liking rating < 5

³ acceptable = mean liking rating ≥ 5

⁴ number of children who found vegetable acceptable / total # of children who ever tried vegetable



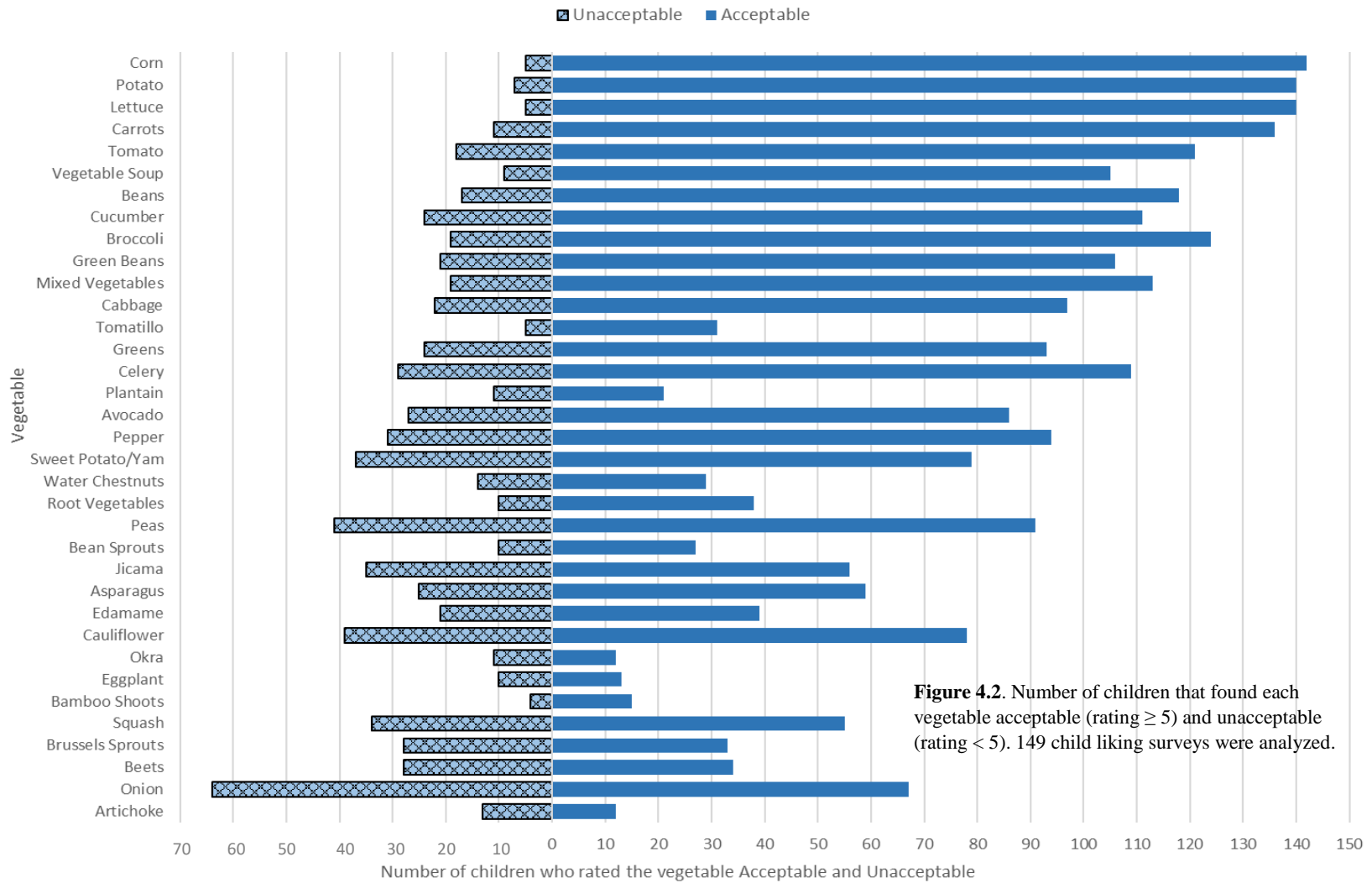


Figure 4.2. Number of children that found each vegetable acceptable (rating ≥ 5) and unacceptable (rating < 5). 149 child liking surveys were analyzed.

Chapter 5: Perspectives gained and future directions

The results presented in Chapters 2 - 4 of this dissertation reinforce the continued need for successful interventions to help parents improve their children's vegetable intake in the home setting. The following paragraphs offer perspectives gained from the almost 3 years of a relatively large-scale longitudinal community nutrition project testing an intervention rooted in the field of behavioral economics.

Two major limitations of the overall study were the self-selection of families into the cooking skills course and the fact that not enough participant families were interested at each host site in order to attain pure randomization. The vast majority of host sites restricted recruitment to on-site residents or members of the programs that were held on-site. Therefore, the number of participant families needed to attain pure randomization was understandably difficult. One potential way to remedy both limitations would be recruitment of a random sample of participant families at various well-populated non-nutrition related places or events (e.g. festivals, fairs).

A future direction to consider would be a study that focuses on parental habit formation of practices that would improve children's vegetable intake. A lack of long-term habit formation of the strategies by parents (described in Chapter 2, pg. 44) may explain why the main intervention of behavioral economics-informed strategies did not affect vegetable intake among children. Habit is defined as actions in the absence of effort that are cue contingent and are associated with behavioral frequency as well as intentions (Bargh, 1994; Strack & Deutsch, 2004). A lecture by Ken Kawachi (2015) noted one reason behavioral interventions fail is that the food preparation behaviors of families may have already been ingrained in habit and therefore are difficult to change. Likewise, a USDA-sponsored large-scale qualitative study among low-income families reported that ethnic and cultural traditions of African American and Hispanic families are strong factors in food choice (Bradbard, Michaels, Fleming, & Campbell, 1997). These include learning about how to shop, and what foods to prepare, from their mothers and

grandmothers. In addition, the 6-week cooking/skills course may not have been long enough to establish the practice of these strategies as true habits, especially if the strategies were novel within the family culture. Lally and colleagues found habit formation can take as long as 254 days, but on average formation of a habit takes longer than 2 months (Lally et al., 2010). Establishment of a critical cue that would trigger the parents to remember to practice the strategies at each meal may be helpful. Baranowski and colleagues (2015) acknowledged that cue-contingent research for vegetable preparation was a next step regarding parenting practices to improve dietary intake for children. Helping parents to set up cues that will unconsciously trigger them to automatically practice strategies to enable increased vegetable consumption by their children may be a novel addition to obesity prevention programs.

Consideration of an intervention using smartphone technology may increase convenience and therefore help ensure completion of the intervention by more participants. In the current study, some participants cited not enough time and location of sessions as hurdles in completing the weekly cooking skills course. Using smartphone technology as an intervention delivery vehicle has gained momentum in the literature (Wang et al., 2014). A recent study by the Pew Research Center reported 77% of all Americans own a smartphone with low-income Americans exhibiting one of the steepest increases of ownership in the last year (Smith, 2017). Mummah and colleagues (Mummah et al., 2017) tested an intervention delivered through a mobile app via smartphone on vegetable consumption among adults. They conducted a randomized controlled trial among 135 overweight adults to test a mobile app that included goal setting and self-monitoring of dietary choices. They found daily vegetable consumption was significantly greater in the intervention versus control condition. In this smartphone era, a study design could utilize this technology to deliver an intervention (via weekly texts, emails, online videos of demonstrations, video chats, etc.) at the participants' convenience without requiring them to be at

a specific location on a certain day/time. It may be interesting to investigate if delivery of an intervention via smartphone technology to parents would be efficacious to outcomes for their children.

An intervention consisting of a single strategy rather than multiple strategies may reduce cognitive burden on low-income parents who already face more stress because of resource scarcity. One study found conditions of poverty translated into a “cognitive deficit” of as many as 10 IQ points (Mani, Mullainathan, Shafir, & Zhao, 2013). Therefore, poverty may result in a reduced capability to take on more decision-making opportunities. Vohs and colleagues’ (2008) tested if making many choices depleted self-control and active responding. They hypothesized that decision making depletes the same resource (executive functioning) used for self-control and active responding. In laboratory experiments with undergraduate participants, they found that making repeated choices depleted the mental energy of the participants. If the participants of the current study had only 1 strategy to implement and practice at home, it may have negated the need for any decision about which strategy to practice, concomitantly promoting more active practice of that strategy.

Further analysis of the outcome measures in Chapter 3 supported a long-term programmatic benefit from cooking and food skills programs. The total number of vegetables tried by all children improved from baseline (LSM = 22, SE = 0.6) to 12-mo follow-up (LSM = 27, SE = 0.6) ($p < 0.0001$). Child BMI-z score improved from immediate post-course (BMI-z = 1.01, SE = 0.11) to 12-mo follow-up (BMI-z = 0.90, SE = 0.11) ($p < 0.04$). These findings may be indicative of a positive effect from the parent and child learning to cook together.

The results in Chapter 4 raise questions about why large proportions of low-income children are not meeting recommended vegetable intake levels (NCI, 2015), despite evidence showing a diverse sample of low-income children who found a wide variety of vegetables

acceptable. Recent ecological data show only 7.9% of American adults are meeting vegetable intake recommendations (Rehm, Peñalvo, Afshin, & Mozaffarian, 2016), indicating that other factors related to child vegetable intake including parental modeling of vegetable intake and home availability remain in critical need of improvement. Trofholz and colleagues (2016) conducted a direct observational study examining factors influencing the foods available at family meals. They found both higher parental intake of vegetables and having vegetables available in the home was associated with the presence of vegetables at family dinners.

Finally, behavioral economics arguably still has potential in community nutrition research, given that dietary habits are governed by irrational decisions. The 2017 Nobel Prize in Economics awarded to Richard Thaler, PhD, the father of behavioral economics, supports the importance of this field of study and potentially helps bring greater attention to how we can ‘nudge’ our irrational decision making processes towards improved dietary choices. Improving children’s vegetable consumption is in clear need of those better decisions.

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Chapter 7: Appendices

Appendix 7.1: Cooking Matters for Families Participant
Recruitment flyer

Research Opportunity
Cooking Matters for Families



The University of Minnesota will be conducting a study that offers an exciting research opportunity for parent/child pairs who will be participating in the *Cooking Matters® for Families*. *Cooking Matters for Families* is a cooking-based, nutrition education program for low-income audiences offered through University of Minnesota Extension.

Who is Eligible?

- Parent/child pairs where the child* is 9-12 years old
 - 8 pairs enrolled per course
 - “First-Come, First-Serve” enrollment basis at Session 1
- Parent/child pairs read, speak, and understand English
- Parent is able to be contacted via phone
- Parent/caregiver has primary responsibility for food acquisition and preparation for the child
- Parent or child meets low-income guidelines and is eligible for public assistance programs including, but not limited to:
 - SNAP, MFIP, NAPS, SSI, WIC, MAC, free or reduced lunches, public/subsidized housing



***only 1 parent per family and 1 child per that parent can enroll in the course**

Participant Involvement

- Attend 10 sessions (S1-S10)
- Sign Consent (adult) and Assent (child) and Participation Waivers
- Complete surveys at *sessions 1, 8, 9, & 10* collecting information on:
 - demographic, diet, food security, height/weight/physical activity (child only), food buying practices, food cooking practice, home food inventory
 - Sessions 1-8 are weekly
 - Session 9 is ~ 6 months after Session 1 and held at same location
 - Session 10 is 12 months after Session 1 and held at same location

Participant Compensation

Parents will be compensated upon completion of the surveys throughout the study:

- \$40 at session 1 (\$20 at session + \$20 after turning in paperwork required at S1)
- \$40 at session 8 (\$20 at session + \$20 after turning in paperwork required at S8)
- \$40 at the 6 months follow-up session (\$20 at session + \$20 after turning in paperwork required at S9)
- \$80 at the 12 months follow-up session: (\$60 at session + \$20 after turning in paperwork required at S10)

Total= \$200

Each child will receive \$20 at:

- AFTER completing 3 food recalls AFTER session 8
- AFTER completing 3 food recalls AFTER follow-up session 1 (S9)
- AFTER completing 3 food recalls AFTER follow-up session 2 (S10)

Total= \$60

Agency Involvement

- Provide childcare during class time as needed for non-participant children. If no childcare can be provided by Agency, then Agency will convey to participants that non-participant children are not allowed in study sessions.
- Assist with the recruitment of 10-12 child/parent teams per course (e.g., flyer postings & distribution, listserv announcement, etc)
- Collect and send contact information of potential participants to Study Coordinator.
- Help convey the importance of consistent attendance and class participation
- Provide the space necessary to conduct all sessions of the study and ensure the space is available, set up and clean prior to the teams arrival
- Provide transportation to participants as needed
- Help study staff communicate any concerns to participants (e.g., not following code of conduct)

*Participation is strictly **voluntary** and can be withdrawn at any time throughout the study. This study is approved by the Institutional Review Board (IRB) of the University of Minnesota.*

For more details:

Francine Overcash,
UMN Project Coordinator
[\(email\)](#)
Ph: (xxx)-xxx-xxxx

Appendix 2: Participant Screening Form

ID	Name (First, Last)	Child	Phone number	Child 9-12 yrs old	You are the Main Food Preparer	Meets Income guidelines	Parent and Child read/spea k/underst and English	Prev CM course
103								
104								
105								
106								
107								
108								
109								
110								
111								
112								

Appendix 3: Parent Consent Form

CONSENT FORM

The Cooking Matters for Families (CMF) Study

You and your child are invited to be in a research study to find out if Cooking Matters for Families will change your child's food choices. You and your child were selected as possible participants because your child is 9-12 years old and you are the main person responsible for preparing meals for this child. We ask that you read this form and ask any questions you have before agreeing to be in this study and before allowing your child to be in this study.

This study is being conducted by: Francine Overcash, Marla Reicks and Zata Vickers from the department of Food Science and Nutrition at the University of Minnesota.

Background Information:

Cooking Matters for Families is a cooking-based, nutrition education program offered through University of Minnesota Extension.

Procedures:

If you agree to be in this study, we will ask you and your child to participate in *Cooking Matters for Families* with 6 cooking classes each week for 6 weeks. We will also ask you and your child to attend a session 1 week before and after the Cooking Matters for Families classes and 6 months and 12 months after the last Cooking Matters for Families class. The research team will contact you to remind you of each upcoming session.

During the first session before the *Cooking Matters for Families* classes begin (Session 1), we will ask you will fill out surveys about yourself, your food preferences, how often you eat certain foods, and your food buying and cooking practices. We will ask your 9-12-year-old to answer similar questions. We will record what your child ate and drank the day before, and measure his or her height, weight and physical activity. After the first session, we will call you on two different days within two weeks and ask to speak with your child about what he or she ate and drank the day before. On the first call we will ask you about food that you have in your home.

One week after the last *Cooking Matters for Families* class (Session 8), we will ask you to fill out surveys about food preferences, your food buying and cooking practices and ask your 9-12-year-old to fill out a similar food preference form. We will record what your child ate and drank the day before. After the 8th session we will again call you on two different days within two weeks and ask to speak with your child about what he or she ate and drank the day before.

At 6 months and 12 months (Sessions 9 and 10), we will collect similar information from you and your child as in the session after the last *Cooking Matters for Families* class.

Risks and Benefits of being in the Study

There are no risks to participation beyond those normally involved in cooking. There are no benefits to participation.

Compensation:

You will receive payment of up to \$200 cash as follows:

1. After completing session 1 (\$20)
2. **Turning in all required paperwork for session 1 (\$20)**
3. After completing sessions 1 to 8 (\$20)

4. **Turning in all required paperwork for session 8 (\$20)**
5. After completing sessions 1 to 8 and session 9, which will occur 6 months after session 8 (\$20)
6. **Turning in all required paperwork for session 9 (\$20)**
7. After completing sessions 1 to 9 and session 10, which will occur 12 months after session 8 (\$60)
8. **Turning in all required paperwork for session 10 (\$20)**

Your 9 - 12-year-old child will receive \$60 cash

1. After completing sessions 1-8 and after the second phone call asking about what he or she ate and drank the day before (\$20)
2. After completing session 9 and after the second phone call asking about what he or she ate and drank the day before. [Session 9 will occur 6 months after session 8] (\$20)
3. After completing session 10 and after the second phone call asking about what he or she ate and drank the day before. [Session 10 will occur 6 months after session 9] (\$20)

Confidentiality:

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a participant. Research records will be stored securely and only researchers will have access to the records. Audio recordings will only be accessible to study investigators and will be destroyed after being transcribed or viewed.

Voluntary Nature of the Study:

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota or the University of Minnesota Extension nutrition education programs. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions:

The researchers conducting this study are Marla Reicks, Zata Vickers, Project Directors and Francine Overcash, Coordinator. You may ask any questions you have now. If you have questions later, you are encouraged to contact Francine Overcash at 612-615-8831 at the University of Minnesota.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to participate in the study. I consent to have my child(ren) to participate in this study.

Name Of Participant (Printed)_____

Signature of participant:_____Date_____

Signature of Investigator: _____ Date: _____

Appendix 4: Child Assent Form

Assent Form for Child
The Cooking Matters® for Families (CMF) Study

We are here today because we are trying to learn more about the foods kids your age like. We are asking if you want to be in a study because you are between the ages of 9 and 12. We hope that finding out which foods you like and what you eat at home will help us learn how to help families eat better in the future.

If you agree to be in this study, we will ask you to participate in *Cooking Matters for Families* and attend a total of 10 sessions. The first 8 sessions take place over the next 9 weeks. You will be asked to attend 2 more sessions, 6 months and 12 months after the 8th session.

During the first session, you will fill out surveys with questions about the foods you eat and your physical activity. We will measure your height and weight. We will record what you ate and drank yesterday. After this first session, we will call you two times within two weeks and ask the same questions about what you ate and drank the day before.

The next 6 sessions will be the Cooking Matters for Families lessons you will attend with your parent or caregiver where you learn how to prepare foods.

During the 8th session, we will again record what you ate and drank the day before. After this 8th session, we will call you two times within two weeks and ask the same questions about what you ate and drank the day before.

At six months and 12 months we will ask you the same questions as in the 8th session.

If you change your mind during the study, you can always let us know and stop participating. Being in this study is totally up to you, and no one will be mad at you if you don't want to do it.

You can ask any questions that you have about this study.

Signing here means that you have read this paper or had it read to you and that you are willing to be in this study. If you don't want to be in this study, don't sign. Remember, being in this study is up to you, and no one will be mad at you if you don't sign this or even if you change your mind later.

Name of Participant (printed) _____
Signature of participant _____ Date _____
Signature of person explaining study _____
_____ Date _____

Appendix 5: Study Demographic Form (Parents)

Demographic Form
CMF Study

1. **What language do you speak at home? (Check one only)**
 - Only English
 - Mostly English
 - English and another language about the same
 - Mostly another language
 - Only another language
 - Other _____

2. **How long have you lived in the U.S.? (Check one only)**
 - 1-5 years
 - 6-10 years
 - More than 10 years

3. **Which of the following best describes your employment status? (Check all that apply)**
 - Homemaker
 - Not employed
 - Employed part-time
 - Employed full-time
 - Retired

4. **How many adults over the age of 18, counting yourself, live in your home? (Check one only)**
 - 1
 - 2
 - 3 or more

5. **How many children living in your home are:**
 - Under the age of 9? _____
 - Between 9-12? _____
 - Between 13-18? _____

Answer the following questions about grocery shopping.

6. **When did you make your last major grocery shopping trip? (Check one only)**
 - 0 to 7 days ago
 - 1 to 2 weeks ago
 - 3 to 4 weeks ago
 - More than a month ago

7. **Are you or your family members participating in the following programs? (Check all that apply)**
 - WIC
 - SNAP (Supplemental Nutrition Assistance Program) or formerly called Food stamps
 - Free/reduced priced school lunch
 - Food shelves, meals, or other food distribution programs

None

8. During the past month, when did you receive SNAP benefits?

Write in the date: _____

OR

I did not receive SNAP benefits

9. How did you learn about this study?

Appendix 7.6: Parent Vegetable Liking Questionnaire

Adult Vegetable Liking Questionnaire:

For each vegetable listed in the table below, please rate **how much you like the vegetable** by circling a number, 1 to 10, where 1 means you “Hate It” and 10 means you “Like it a lot.” Circle “Never had it” if you’ve never tried the listed vegetable. In addition, please circle No, Yes, or Don’t Know if you have eaten the vegetable in the past month:

Vegetable		Hate it		It’s okay								Like it a lot	Have you eaten it in the past month?		
		1	2	3	4	5	6	7	8	9	10	No	Yes	Don’t Know	
Artichoke	Never had it	1	2	3	4	5	6	7	8	9	10	No	Yes	Don’t Know	
Asparagus	Never had it	1	2	3	4	5	6	7	8	9	10	No	Yes	Don’t Know	
Avocado/ guacamole	Never had it	1	2	3	4	5	6	7	8	9	10	No	Yes	Don’t Know	
Bamboo shoots	Never had it	1	2	3	4	5	6	7	8	9	10	No	Yes	Don’t Know	
Bean sprouts	Never had it	1	2	3	4	5	6	7	8	9	10	No	Yes	Don’t Know	
Beans (black, bean dishes, kidney, lentil, hummus)	Never had it	1	2	3	4	5	6	7	8	9	10	No	Yes	Don’t Know	

Beets	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Broccoli	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Brussels sprouts	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Cabbage	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Cauliflower	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Carrots	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Celery	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Corn	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Cucumber	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know

Edamame	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Eggplant	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Greens (spinach, collard, bok choy, kale)	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Green beans	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Jicama	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Lettuce	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Mixed vegetables	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Okra	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know

Onion	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Peas	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Pepper (red, orange, green)	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Hot Peppers (chilies)	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Plantain	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Potato	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Root vegetables (yucca, radish, rutabaga, parsnip, turnip, taro)	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know

Soup (tomato)	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Sweet potato/yam	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Tomatillo	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Tomato	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know
Water chestnuts	Never had it	1	2	3	4	5	6	7	8	9	10	N	Y	Don't Know

Appendix 7.7: Home Food Inventory Questionnaire

Home Food Inventory Instructions

CMF Study

- ❖ Look around your house and record the amount of **vegetables** you have in your home— This includes all **fresh, frozen, canned/jarred, and dried vegetables.**
- ❖ Look through all the places you store vegetables, like your refrigerator, freezer (don't forget any deep freezers you have in other parts of the house), pantries, and cupboards.”
- ❖ First find the vegetable on the chart. Then move to right of the page and choose a column (“Fresh”, “Canned/Jar”, or “Frozen”) and write the AMOUNT of the vegetable below.
 - *For example, Broccoli: In your fridge you have a head of broccoli. (1) Find Broccoli on the chart (all vegetables are alphabetical) and (2) Estimate how much you have under the “FRESH” column. When you move on to your freezer, you find that you also have a package of frozen broccoli. You would stay on the same row/line and list the same information (#, unit: such as small/medium/large OR estimate how much in cups under the “FROZEN” column).*
 - **TIP 1:** A lot of pre-packaged vegetables will have ounces listed on the bag or can (looks like “oz.”). Fresh vegetables tend to be little more difficult when you have a situation like the broccoli. You can estimate how many cups you would have of the broccoli after you cut it up, or you can just write 1 small/medium/large head of broccoli and we'll do the rest. Frozen broccoli bags often will have the unit on them, like “16 oz.” on the front of the packaging. **REFER to the attached Can Diagram.**
 - Small, medium, or large is also a good way to estimate for bell peppers, heads of iceberg lettuce or cabbage, cucumbers, tomatoes, onions, etc.
 - **TIP 2:** For the “Canned/Jar” and “Frozen” columns, it will probably be easier to estimate using the amount that is listed on the can/jar/package. Even if you have only a portion of the package left, give your best estimate. For example, if you have around $\frac{1}{4}$ package left of a 8oz bag of frozen Okra, then just list 2oz under the “FROZEN” column of Okra. *If the math ever seems too difficult, you can always write it like this, ($\frac{1}{8}$) of 24 oz package and we'll do the math later.*
- ❖ If you are unsure of how to estimate the amount, write a small description of the vegetable you have and you can ask us for help later (either on the phone or when you turn them in at Lesson 2). Someone will call to check in and answer any questions you have about one week after this session. We will also be contacting your family to collect dietary recalls from your child, and you are welcome to ask us any questions those times about your food inventory.
- ❖ For Beans, please list all the different types of beans you may have and then the estimates for each (black, baked, kidney, etc.)—if you need more space feel free to add to the back of the form. “

(TURN Page OVER for example)

Please fill this out as soon as possible. Preferably in the next day or two. You will need to bring this form with you to the next Session. We will call you to remind you of the upcoming session. If you provide us with an email address, we will send you an email to remind you to bring back this form to the next session.

REMEMBER for each of the 3 columns: **FRESH, CAN/JAR, FROZEN**, you need to list:

1. Number of (Quantity)
2. Amount of each (i.e., Unit)
 - a. For **Fresh** column, you can simply use, Small, Medium, or Large to describe the amount. For example, use small, medium or large to describe a FRESH head of broccoli, a fresh carrot, or a FRESH bell pepper, etc.
 - b. For **Can/Jar** column. Use the Attached Can Diagram to label each can or jar, small, medium, or large.
 - c. **NOTE: for DRIED Vegetables (e.g., dried beans)—list these under the “Can/Jar” column**

(SEE EXAMPLE HERE)

	Fresh	Can/Jar	Frozen
a. Bean Sprouts			
b. Broccoli			
c. Green Peas			
d. Water chestnuts			

HOME FOOD INVENTORY SURVEY- CMF Study Date Completed:

	Fresh	Can/Jar	Frozen
a. Artichoke			
b. Asparagus			
c. Avocado/guacamole			
d. Bamboo shoots			
e. Bean sprouts			
f. Beans (black, pinto, kidney, navy, white, refried, baked, lima, soy, black-eyed, garbanzo/chickpea, hummus, lentils, split peas)			
g. Beets			
h. Broccoli			
i. Brussels sprouts			
j. Cabbage (sauerkraut, coleslaw)			
k. Cauliflower			
l. Carrots			
m. Celery			
n. Corn (hominy)			

	Fresh	Can/Jar	Frozen
o. Cucumbers (pickles)			
p. Edamame			
q. Eggplant			
r. Greens (spinach, collard, mustard, turnip, kale, bok choy)			
s. Green beans (snap, string, wax)			
t. Jicama			
u. Lettuce (romaine, endive, iceberg)			
v. Mixed vegetables			
w. Okra			
x. Onions (white, red, green, leek)			
y. Peas (green, snap peas, snow peas)			
z. Peppers (red, green, hot)			
aa. Plantains			

	Fresh	Can/Jar	Frozen
bb. Potatoes – white/russet (fries, box mixes, hash browns, potato salad)			
cc. Root vegetables – other than potatoes (yucca/cassava, yautia, taro, rutabaga, parsnip, turnip, radish)			
dd. Soup (vegetable, tomato)			
ee. Squash (butternut, acorn, pumpkin, zucchini)			
ff. Sweet Potatoes/Yams			
gg. Tomatillos			
hh. Tomatoes (Tomato sauce, canned tomatoes, salsa, spaghetti sauce, pizza sauce, tomato juice, in mixed dishes)			
ii. Water chestnuts			
Other			
Other			
Other			

Appendix 7.8: Cooking Vegetables Questionnaire

Cooking Vegetables Survey
CMF Study

To be completed by the adult person most responsible for preparing food for this household.

1. How confident do you feel about cooking/preparing each of the vegetables listed below?
(please check one box for each vegetable)
2. *For this survey, “preparing” food means anything you might do to make the food suitable to eat (for example, make a salad from it)

Vegetable	Not at all sure (1)	Slightly sure (2)	Somewhat sure (3)	Very sure (4)	Extremely sure (5)	Never cooked/ prepared
Asparagus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Avocado/ guacamole	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bean sprouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Beans- (black, bean dishes, kidney, lentil, hummus)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Broccoli/Cauliflower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brussels Sprouts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cabbage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Celery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Corn	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cucumber	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Edamame	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Greens (spinach, collard, bok choy, kale)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Green beans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jicama	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lettuce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mixed vegetables	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mushrooms						<input type="checkbox"/>
Okra	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Onion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Peas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pepper (red, orange, green)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Vegetable	Not at all sure (1)	Slightly sure (2)	Somewhat sure (3)	Very sure (4)	Extremely sure (5)	Never cooked/ prepared
Peppers (chilies, hot)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plantain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Potato	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Root vegetables (yucca, rutabaga, beets, parsnip, turnip, taro, carrots)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Squash/Pumpkin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sweet potato/yam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tomato	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Zucchini and other summer squashes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How confident do you feel about using these cooking techniques to prepare vegetables, or mixed meals which include vegetables? (Please tick one box for each technique)

	Not at all sure	Slightly sure	Somewhat sure	Very sure	Extremely sure	Never cooked/ prepared
Boiling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steaming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Shallow frying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deep frying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roasting/baking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stir frying	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Microwaving	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stewing/braising	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Please tell us how much you agree or disagree with the following statements about cooking with the child you are participating with in this study.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

I enjoy cooking with my child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I cook with my child often.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to cook more with my child.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooking with my child takes too much time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooking with my child can be frustrating.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cooking with my child is too much extra work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 7.9: Personal Reaction Inventory (Parents)

Personal Reaction Inventory
CMF Study

Listed below are a number of statements concerning personal attitudes and traits.
Read each item and decide whether the statement is *True* or *False* as it pertains to you personally.

	<i>True</i>	<i>False</i>
1. I never hesitate to go out of my way to help someone in trouble.	<input type="checkbox"/>	<input type="checkbox"/>
2. I have never intensely disliked anyone.	<input type="checkbox"/>	<input type="checkbox"/>
3. I sometimes feel resentful when I don't get my way.	<input type="checkbox"/>	<input type="checkbox"/>
4. There have been times when I felt like rebelling against people in authority even though I knew they were right.	<input type="checkbox"/>	<input type="checkbox"/>
5. I can remember "playing sick" to get out of something.	<input type="checkbox"/>	<input type="checkbox"/>
6. When I don't know something I don't at all mind admitting it.	<input type="checkbox"/>	<input type="checkbox"/>
7. I am always courteous, even to people who are disagreeable.	<input type="checkbox"/>	<input type="checkbox"/>
8. I would never think of letting someone else be punished for my wrong doings.	<input type="checkbox"/>	<input type="checkbox"/>
9. There have been times when I was quite jealous of the good fortune of others.	<input type="checkbox"/>	<input type="checkbox"/>
10. I am sometimes irritated by people who ask favors of me.	<input type="checkbox"/>	<input type="checkbox"/>

Appendix 7.10: U.S. Household Food Security Questionnaire (Parents)

U.S. Household Food Security Survey
CMF Study

These questions are about the food eaten in your household in the last 12 months, and whether you were able to afford the food you need.

1. For each statement in the table, place an 'X' whether the statements in the following table were "often true", "sometimes true", or "never true" for (you/your household) in the last 12 months.

	Often True	Some-times True	Never True	Don't Know/ Prefer Not to Answer
"The food that we bought just didn't last, and we didn't have money to get more."				
"We couldn't afford to eat balanced meals."				

2. In the last 12 months, did (you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes, almost every month
- Yes, some months but not every month
- Yes, only 1 or 2 months
- No
- Don't know /Prefer not to answer

3. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?

- Yes
- No
- Don't know /Prefer not to answer

4. In the last 12 months, were you ever hungry but didn't eat because there wasn't enough money for food?

- Yes
- No
- Don't know /Prefer not to answer

Appendix 7.11: Weekly Habit Questionnaires

Participant ID: _____
Session 3

Cooking Matters Questionnaire

Check the box by the answer that is best for you. Answer the question about your 9-12 year old child in class with you.

How often did your child help prepare vegetables for meals last week?	Never <input type="checkbox"/>	Once in a while <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
How hard was having your child help prepare vegetables for meals last week?	Not hard <input type="checkbox"/>	A little bit hard <input type="checkbox"/>	Somewhat hard <input type="checkbox"/>	Very hard <input type="checkbox"/>
I automatically have my child help prepare vegetables for meals.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Session 4
Participant ID # 002

Cooking Matters Questionnaire

Check the box by the answer that is best for you. Answer the question about your 9-12 year old child in class with you.

How often did you have your child use the MyPlate last week at dinner?	Never <input type="checkbox"/>	Once in a while <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
How hard was having your child use the MyPlate last week at dinner?	Not hard <input type="checkbox"/>	A little bit hard <input type="checkbox"/>	Somewhat hard <input type="checkbox"/>	Very hard <input type="checkbox"/>
I automatically have my child help me prepare vegetables for meals.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate at meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Session 5
Participant ID #

Cooking Matters Questionnaire

Check the box by the answer that is best for you. Answer the question about your 9-12 year old child in class with you.

How often did you leave vegetables on the table and put the other foods on the counter last week at meals?	Never <input type="checkbox"/>	Once in a while <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
How hard was leave vegetables on the table and put the other foods on the counter last week at meals?	Not hard <input type="checkbox"/>	A little bit hard <input type="checkbox"/>	Somewhat hard <input type="checkbox"/>	Very hard <input type="checkbox"/>
I automatically have my child help me prepare vegetables for meals.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate at meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
I leave vegetables on the table and put the other foods on the counter during meals without even thinking about it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Session 6
Participant ID #

Cooking Matters Questionnaire

Check the box by the answer that is best for you. Answer the question about your 9-12 year old child in class with you.

How often did you serve two vegetables last week at dinner?	Never <input type="checkbox"/>	Once in a while <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
How hard was serving two vegetables with dinner last week?	Not hard <input type="checkbox"/>	A little bit hard <input type="checkbox"/>	Somewhat hard <input type="checkbox"/>	Very hard <input type="checkbox"/>
I automatically have my child help prepare vegetables for meals.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate at meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
I leave the vegetables on the table for my child and put the other foods on the counter during meals without even thinking about it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving two vegetables at meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Session 7
Participant ID #

Cooking Matters Questionnaire

Check the box by the answer that is best for you. Answer the question about your 9-12 year old child in class with you.

How often did you serve vegetables before meals last week?	Never <input type="checkbox"/>	Once in a while <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
How hard was serving vegetables before meals last week?	Not hard <input type="checkbox"/>	A little bit hard <input type="checkbox"/>	Somewhat hard <input type="checkbox"/>	Very hard <input type="checkbox"/>
I automatically have my child help prepare vegetables for meals.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate at meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
I leave the vegetables on the table for my child and put the other foods on the counter during meals without even thinking about it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving two vegetables at meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
I serve vegetables to my child before meals without having to purposely remember to do it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Appendix 7.12: Follow Up Habit Questionnaire

Session 8,9,10
Participant ID #

Cooking Matters Questionnaire

Check the box by the answer that is best for you. Answer the question about your 9-12 year old child in class with you.

How often did you serve vegetables using a larger spoon at meals last week?	Never <input type="checkbox"/>	Once in a while <input type="checkbox"/>	Often <input type="checkbox"/>	Always <input type="checkbox"/>
How hard was serving vegetables using a larger spoon at meals last week?	Not hard <input type="checkbox"/>	A little bit hard <input type="checkbox"/>	Somewhat hard <input type="checkbox"/>	Very hard <input type="checkbox"/>
Having my child help prepare vegetables for meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child help prepare vegetables for meals is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child help prepare vegetables for meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child help prepare vegetables for meals is something I do without having to consciously remember.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate for meals is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate at meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Leaving the vegetables on the table for my child and moving the other food away during meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Leaving the vegetables on the table for my child and moving the other food away during meals is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Leaving the vegetables on the table for my child and moving the other food away during meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Leaving the vegetables on the table for my child and moving the other food away during meals is something I do without having to consciously remember.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate at meals is something I do without having to consciously remember.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Having my child use the MyPlate at meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving two vegetables at meals is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving two vegetables at meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving two vegetables at meals is something I do without having to consciously remember.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Serving two vegetables at meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving vegetables to my child before meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving vegetables to my child before meals is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving vegetables to my child before meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving vegetables to my child before meals is something I do without having to consciously remember.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Reminding my child to floss his or her teeth every day is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Reminding my child to floss his or her teeth every day is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Reminding my child to floss his or her teeth every day is something I do without having to consciously remember.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Reminding my child to floss his or her teeth every day is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Asking my child about his or her homework every day is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Asking my child about his or her homework every day is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Asking my child about his or her homework every day is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Asking my child about his or her homework every day is something I do	Strongly disagree	Disagree	Agree	Strongly Agree

without having to consciously remember.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Serving vegetables to my child with a larger spoon at meals is something I do without thinking.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving vegetables to my child with a larger spoon at meals is something I do automatically.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving vegetables to my child using a larger spoon at meals is something I do without having to consciously remember.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>
Serving vegetables to my child with a larger spoon at meals is something I start doing before I realize I'm doing it.	Strongly disagree <input type="checkbox"/>	Disagree <input type="checkbox"/>	Agree <input type="checkbox"/>	Strongly Agree <input type="checkbox"/>

Appendix 7.13: Home Food Inventory Addendum

Home Inventory Form- ADDENDUM
CMF Study
Sessions 8,9,10

Answer the following questions about grocery shopping.

1. When did you make your last major grocery shopping trip? (Check one only)

- 0 to 7 days ago
- 1 to 2 weeks ago
- 3 to 4 weeks ago
- More than a month ago

2. Are you or your family members participating in the following programs? (Check all that apply)

- WIC
- SNAP (Supplemental Nutrition Assistance Program) or formerly called Food stamps
- Free/reduced priced school lunch
- Food shelves, meals, or other food distribution programs
- None

3. During the past month, when did you receive SNAP benefits?

Write in the date: _____

OR

- I did not receive SNAP benefits

Appendix 7.14: Child Vegetable Liking and Variety Questionnaire

Child Liking
CMF Study

For each vegetable listed in the table below, please rate how much you like the vegetable by circling a number, 1 to 10, where 1 means you “Hate It” and 10 means you “Like it a lot.” Circle “Never had it” if you’ve never tried the listed vegetable.

Please remember to include vegetables in casseroles, soups, and other mixed dishes

Vegetable		Hate it			It’s okay				Like it a lot		
Artichoke	Never had it	1	2	3	4	5	6	7	8	9	10
Asparagus	Never had it	1	2	3	4	5	6	7	8	9	10
Avocado/ guacamole	Never had it	1	2	3	4	5	6	7	8	9	10
Bamboo shoots	Never had it	1	2	3	4	5	6	7	8	9	10
Bean sprouts	Never had it	1	2	3	4	5	6	7	8	9	10
Beans (black, bean dishes, kidney, lentil, hummus)	Never had it	1	2	3	4	5	6	7	8	9	10

Vegetable		Hate it	It's okay							Like it a lot	
Beets	Never had it	1	2	3	4	5	6	7	8	9	10
Broccoli	Never had it	1	2	3	4	5	6	7	8	9	10
Brussels sprouts	Never had it	1	2	3	4	5	6	7	8	9	10
Cabbage	Never had it	1	2	3	4	5	6	7	8	9	10
Cauliflower	Never had it	1	2	3	4	5	6	7	8	9	10
Carrots	Never had it	1	2	3	4	5	6	7	8	9	10
Celery	Never had it	1	2	3	4	5	6	7	8	9	10
Corn	Never had it	1	2	3	4	5	6	7	8	9	10

Vegetable		Hate it		It's okay						Like it a lot	
		1	2	3	4	5	6	7	8	9	10
Cucumber	Never had it	1	2	3	4	5	6	7	8	9	10
Edamame	Never had it	1	2	3	4	5	6	7	8	9	10
Eggplant	Never had it	1	2	3	4	5	6	7	8	9	10
Greens (spinach, collard, bok choy, kale)	Never had it	1	2	3	4	5	6	7	8	9	10
Green beans	Never had it	1	2	3	4	5	6	7	8	9	10
Jicama	Never had it	1	2	3	4	5	6	7	8	9	10
Lettuce	Never had it	1	2	3	4	5	6	7	8	9	10

Vegetable		Hate it	It's okay							Like it a lot	
Mixed vegetables	Never had it	1	2	3	4	5	6	7	8	9	10
Okra	Never had it	1	2	3	4	5	6	7	8	9	10
Onion	Never had it	1	2	3	4	5	6	7	8	9	10
Peas	Never had it	1	2	3	4	5	6	7	8	9	10
Pepper (red, orange, green)	Never had it	1	2	3	4	5	6	7	8	9	10
Hot Peppers (chilies)	Never had it	1	2	3	4	5	6	7	8	9	10
Plantain	Never had it	1	2	3	4	5	6	7	8	9	10
Potato	Never had it	1	2	3	4	5	6	7	8	9	10

Vegetable		Hate it	It's okay								Like it a lot
Root vegetables (yucca, radish, rutabaga, parsnip, turnip, taro)	Never had it	1	2	3	4	5	6	7	8	9	10
Soup (tomato)	Never had it	1	2	3	4	5	6	7	8	9	10
Sweet potato/yam	Never had it	1	2	3	4	5	6	7	8	9	10
Tomatillo	Never had it	1	2	3	4	5	6	7	8	9	10
Tomato	Never had it	1	2	3	4	5	6	7	8	9	10
Water chestnuts	Never had it	1	2	3	4	5	6	7	8	9	10

Appendix 7.15: Child Cooking Interest and
Self-Efficacy Questionnaire

Cooking Interest Survey - Child
AFTER COURSE

CMF Study

Please put an "X" in the box to mark your answer.

1. How do you feel about cooking?
 - I really like to cook.
 - I kind of like to cook.
 - I'm not sure if I like to cook.
 - I don't like to cook.
 - I really don't like to cook.

2. How do you feel about foods that you have helped cook?
 - I really like foods that I have helped cook.
 - I kind of like foods that I have helped cook.
 - I'm not sure if I like foods that I have helped cook.
 - I don't like foods that I have helped cook.
 - I really don't like foods that I have helped cook.

3. How do you feel about measuring ingredients?
 - I really like to measure ingredients.
 - I kind of like to measure ingredients.
 - I'm not sure if I like to measure ingredients.
 - I don't like to measure ingredients.
 - I really don't like to measure ingredients.

4. How do you feel about making snacks?
 - I really like to make snacks.
 - I kind of like to make snacks.
 - I'm not sure if I like to make snacks.
 - I don't like to make snacks.
 - I really don't like to make snacks.

5. How do you feel about making food with your friends?
 - I really like to make food with my friends.
 - I kind of like to make food with my friends.
 - I'm not sure if I like to make food with my friends.
 - I don't like to make food with my friends.
 - I really don't like to make food with my friends.

6. How do you feel about making food with your family?
 - I really like to make food with my family.
 - I kind of like to make food with my family.
 - I'm not sure if I like to make food with my family.
 - I don't like to make food with my family.
 - I really don't like to make food with my family.

**Cooking Confidence Survey - Child
CMF Study**

Please put an "X" in the box to mark your answer.

1. I can make a snack with fruit.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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2. I can make a snack with vegetables.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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3. With help, I can use a recipe.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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4. I can help my family make a meal.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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5. I can make a salad.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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6. I can cut up food.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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7. I can measure ingredients.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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8. I can follow recipe directions.

<input type="checkbox"/> YES!	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> NO!	<input type="checkbox"/> Not sure
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Appendix 7.16: Child Physical Activity Survey

Physical Activity Survey - Child
CMF Study

The information you give will be used to improve health education for young people like yourself. Please read each question below and circle your answer.

1. During the past 7 days, on how many days were you physically active for a total of **at least 60 minutes per day**? (Add up all the time you spent in any kind of physical activity that increased your heart rate and made you breathe hard some of the time.)
 - A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
 - G. 6 days
 - H. 7 days

2. On how many of the past 7 days did you do exercises to **strengthen or tone your muscles**, such as push-ups, sit-ups, or weight lifting?
 - A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
 - G. 6 days
 - H. 7 days

3. On an average school day, how many hours do you watch TV?
 - A. I do not watch TV on an average school day
 - B. Less than 1 hour per day
 - C. 1 hour per day
 - D. 2 hours per day
 - E. 3 hours per day
 - F. 4 hours per day
 - G. 5 or more hours per day

4. On an average school day, how many hours do you play video or computer games or use a computer for something that is not school work? (Count time spent on things such as

Xbox, PlayStation, an iPod, an iPad or other tablet, a smartphone, YouTube, Facebook or other social networking tools, and the Internet.)

- A. I do not play video or **computer** games or use a computer for something that is not school work
- B. Less than 1 hour per day
 - C. 1 hour per day
 - D. 2 hours per day
 - E. 3 hours per day
 - F. 4 hours per day
 - G. 5 or more hours per day
5. In an average week when you are in school, on how many days do you go to physical education (PE) classes?
- A. 0 days
 - B. 1 day
 - C. 2 days
 - D. 3 days
 - E. 4 days
 - F. 5 days
6. During the past 12 months, on how many sports teams did you play? (Count any teams run by your school or community groups.)
- A. 0 teams
 - B. 1 team
 - C. 2 teams
 - D. 3 or more teams

Appendix 7.17 Child Height/Weight Form

CHILD HEIGHT/WEIGHT Form
CMF Study

To be completed by Research Staff

Participant ID _____ **Session #** _____ **Date** _____

HEIGHT & WEIGHT

Instructions: Record height and weight 3 times at each data collection session (sessions 1, 8, 9, &10)

	Height (cm, to nearest 0.1 cm)	Weight (kg, to nearest gram (1.xxx))
#1		
#2		
#3		

Appendix 7.18: Session Procedures and Scripts
Intervention Group Version

SESSION TWO:
Cooking Side-by-Side!

Upon Arrival:

- Ask families to check in
- Distribute name tags
- Collect Home Food Inventory Forms

Overall Goals for Session:

Families will:

- Work together to make healthy meals that everyone will enjoy.
- Increase the frequency of including vegetables in meals.
- Eat meals together more often.

Strategy Session Goals (Intervention Group Only):

Parent/caregivers:

- Can summarize how behavioral strategies will be introduced and evaluated over the course of the program (introduction by NE one week, practice at home, report back next week)
- Can demonstrate how to correctly use this week's strategy: Child helps prepare the vegetables for meals.
- Will have a plan for implementing the strategy at a meal the next day.

Objectives:

Families will be able to:

- Identify age-appropriate tasks for children in the kitchen
- Practice using kitchen safety practices including handling knives safely
- Identify pros and cons of using different forms of vegetables
- Include a variety of vegetables at meals
- List strategies to share more meals together

Recipe(s): Turkey Tacos

I. Introduction (Nutrition Educator (NE), 15 minutes)

***The NE should begin the session by 5 minutes past the official start time of the session and not wait until all participants have arrived.**

1. Welcome families. Provide an overview of the Overall GOALS for Session.
2. NE will introduce him/herself briefly, offering any information that will help families relate. Talk about your career path or other personal interests, and what you were interested in when you were the same age as the children in your group. The NE may briefly re-introduce study staff and CHEF.
3. Invite everyone to introduce themselves and name their favorite vegetable.
4. Establish a code of conduct for the class. Display the following code on a poster board that can be posted each week (**Study Staff will bring**). In addition to the following, solicit several more ideas from the participants:
 - No outside food. (For the ~2 hrs of this class we want a healthy food zone so we request that you don't bring in outside food or beverages. Remember we will be enjoying a healthy meal at the end of class.)
 - Please ensure your phones are on vibrate or turned off.
 - Please be on time every session. (We will have the cooking demonstration as the first part of most classes and we don't want you to miss it!)
 - No negative comments about foods.
 - Come back to attention quickly.
 - Be open to trying new foods.
 - Work as a family team on all activities.

“Today we will talk about how families can work together to create healthy meals that everyone will enjoy.”

II. Cooking and Food Safety (Chef/Nutrition Educator, 55 minutes)

****The Handouts referenced throughout the lesson do not have to be read in detail, but the Chef and NE should provide enough information to give participants a brief summary of the main ideas from the handout, highlighting the most important aspects.**

During the Cooking demonstration, the classroom assistant and study staff will set up participant preparation stations.

1. The CHEF and NE will stand together in front of the group. Together, they will emphasize that this is an opportunity for parents and children to learn new skills and ways to work together safely in the kitchen. Throughout the course they will also learn creative ways to “choose foods from every food group” while making meals that satisfy the whole family.
2. **ASK (NE):** What's good about having the whole family working together in the kitchen? Add to the discussion as needed, emphasizing that cooking together promotes positive eating habits for the whole family, teaches children responsibility and builds self-confidence, and makes mealtime more fun.

3. (**CHEF, BEFORE Demo**) Discuss the importance of kitchen safety to prevent foodborne illness and accidents. Refer to the *Cooking Safely* handout.

Review the proper way to wash hands. Explain that washing hands is one of the most important steps we can take to prevent foodborne illness.

4. The **CHEF** will demonstrate the entire process of preparing the TURKEY TACOS recipe.

*****The demo should take < 30 minutes.**

- a. Emphasize that these recipes allow each family member to choose which foods they would like to add to their meal based on their preferences. For example, children can choose which vegetables to add to their tacos.
 - b. Explain that accidents can be prevented in the kitchen by following safety rules.
Review basic knife skills.
 - c. Set policies for safe knife use and kitchen behaviors in class.
5. During the cooking demonstration, the NE will incorporate elements of the Nutrition Lesson as appropriate and relevant. For example, the NE may:
 - Refer to the *Vary Your Veggies* handout. Point out the health benefits that colorful produce provides. Ask parents and children which colors they like to see on their plates, relate the colors to the orange, red and green colors in the Turkey Tacos.
 - Discuss ideas from the *Community Resources for Vegetables* handout: **ASK:** Where do you get your vegetables? to introduce the topic.
 6. (**CHEF, during Demo**) Refer to the *Cooking Side by Side* handout and highlight a few tips. Point out that parents should use their experience working with their children in this class and at home as a guide for assigning tasks in the kitchen.
 - Highlight that recipes have specific steps suggested for children, which will make it easier to divide tasks at home. Point out that families will be getting the recipes in a booklet at the end of the course.
 - Highlight items from *Talk like a Chef and Measure Up* handouts as they are described during the demonstration. For example, review the terms Chop, Dice and Mince as the carrots, sweet potato, zucchini or tomatoes are prepared for Turkey Tacos. Review measuring abbreviations and terms when measuring spices for the Turkey Tacos.

Participant Preparation of Food (<25 minutes)

1. Have families wash their hands, using proper technique, in preparation for cooking today's recipes. *NOTE if Cooking Demo is running longer than 30 minutes, the NE may want to initiate the washing of hands during the demo, directing small groups at a time to the hand washing stations.
2. Group several parent-child pairs into cooking teams and assign each team tasks, delegate different steps in the recipe, noting which steps children can take on themselves. Walk around the room, answering any questions and commenting on technique.

3. Have some of the children demonstrate their understanding of basic knife skills in front of their parents.
 4. Have children use a vegetable peeler to peel carrots and a can opener to open canned vegetables. As needed, gently correct unsafe knife use.
 5. **(CHEF)** Highlight the cooking terms and ingredient measures in the recipes and assess whether these are new concepts for participants.
 6. **(CHEF AND NE)** Ask children to describe the cooking tasks they performed independently, and congratulate them on their success.
 7. The **CHEF** will instruct the participants to start browning the taco meat but the **CHEF** may have to finish, depending on time. If more than 25 minutes have elapsed since participants began preparing the food, the **NE** should move participants to the location of the Nutrition Lesson (III).
 8. The **CHEF** will keep the prepared food warm until the families are ready to eat together.
- Upon completion of food preparation, the NE will ask participants to sit down at the tables for the Nutrition Lesson.**

III. NUTRITION (Nutrition Educator, <15 minutes)

*****Some items from the Nutrition Lesson have been incorporated during the Cooking Demonstration. The remaining content can be covered at this time.***

1. **ASK:** Which form of vegetables do you prefer (fresh, frozen, canned)? What do you like about this form? Engage children by asking them which forms of vegetables they have tried.
2. Refer to the ***Fresh, Frozen, and Canned*** handout. Emphasize that there is no "best" form. Discuss the pros and cons of each form,
3. Discuss access to vegetable sources keeping in mind what has already been covered during the cooking demonstration. **ASK:** Where do you get your vegetables? Refer to the ***Community Resources for Vegetables*** handout. In addition to conventional grocery stores like Cub Foods/Rainbow, describe the following sources:
 - a. Discount store chains: Aldi, Wal-mart, Dollar Stores (frozen foods)
 - b. Food shelves
 - c. Fare-for-all
 - d. Community Gardens. **ASK** about access to community gardens.
 - e. Farmer's Markets. **ASK:** Did you know many vendors at Farmer's Markets discount their foods in the last 1-1.5 hour? Do you use SNAP benefits at Farmer's Markets?
4. Refer to the ***Vary Your Veggies*** handout. Review the health benefits that colorful produce provides as discussed during the Cooking Demonstration, pointing out the various colors of vegetables in the meal being prepared.

*****At this point the Nutrition Educator will initiate a mini-break where the children will be grouped separated from their parents. They will be 'entertained' with an activity (not based on nutrition topics) led by a study staff member:***

“Now the children and parents will be separated to complete different activities. The children will be enjoy activities led by a member of our study team while the parents will stay here and have a separate lesson.”

The tables where the parents sit should be rearranged so they sit as closely as possible ‘around’ a table or a small space.

*****NOTE FOR TIMING:** Study staff should limit the child-only activity to ~ 10 minutes, ending it while the parents are still participating in their separate lesson. The study staff should direct the children to start fixing the taco plates for both the parent and child (2 plates/child) and bring the pre-plated tacos to the table to enjoy after the parents are finished with the strategy session.

IV. Discussion of Strategy: Child Helps Prepare the Vegetables for Meals (Nutrition Educator, 15 minutes)

1. Introduction

“We separated you from your children at this point because we want to talk about the main purpose of this study. In this study, we are asking parents to use strategies at home that can help your child eat more vegetables. These strategies are small changes to help your child make healthier food choices that are easy to use and cost little or nothing.”

“Each week you will have a cooking lesson to learn how to prepare healthy meals. We just finished the lesson for this week. Then, each week we will be teaching you to use a new strategy in your home at mealtimes to help your child eat more vegetables. After learning the strategy, we will ask that you use it at home as often as you can. We will also be practicing the strategy during the cooking part of the class or when we eat together at the end of each class.”

*“At the next week’s lesson, we will ask you to fill out a short survey about using these strategies. We will then ask your advice about what made it easy or hard to use. Your input will be **very important** for us to help other parents in the future.”*

“We will be recording the part of every session where we teach you to use a new strategy and learn about how you used it at home. Your input is valuable to this research study and will help us develop lessons for other parents. We truly appreciate your contribution and please know it directly impacts the study’s results and goals.”

*“Finally, and this is **VERY** important: We do not want your child to know that you are trying to use these strategies to get them to eat more vegetables. Please do not discuss the strategies with them or what we talk about during this part of the lesson.”*

“I am going to turn the recorder on now.” (Place the recorder front and center to get the best recording.) “Please make sure to speak clearly and not talk when others are talking so the recording is clear and it is easy to hear your comments.”

2. INTRODUCE the strategy: Having your child help prepare the vegetables for meals.

Cooking with your children can be a positive experience, giving them helpful life skills at the same time. Some children find a sense of pride in helping their parent prepare the vegetables. Children are often far more willing to eat foods they helped prepare. You may be creating good helpers for you in the kitchen so meals are prepared faster as well as having your child eat more vegetables.”

“Your strategy for this week is to have your child help prepare vegetables for meals. (Show the strategy poster to the group and refer to handout.)

Here are some ways you can have your child help prepare vegetables:”

- Get vegetables out and wash them.
- Read a recipe aloud on how to prepare the vegetable.
- Peel and cut vegetables with your help if necessary (like in today’s food preparation).
- Use a can opener to open cans of vegetables (like in today’s food preparation).
- Put vegetables in microwavable bowl and use the microwave to warm them.
- Stir vegetables on the stove top with your help if necessary.
- Place the vegetables in serving containers or on plates.

NOTE: *“During the Cooking part of this class, your child practiced using vegetable peelers and can openers. You will be taking home a peeler in your take-home grocery bag.”*

3. CLARIFY the strategy:

*“Let’s make sure that we are all clear about what we asking you to do for this strategy. We want your child to help prepare vegetables. Preparing other foods or cleaning up is **not** using this strategy.”*

ASK: What questions do you have about using this strategy?

ASK: What problems do you expect when you use this strategy?

NE will ask each participant the following question(s) before ending this part:

ASK: “Think about a meal you will have for your family tomorrow. What will you ask your child to do to prepare vegetables for that meal?” ****NE should gently correct if responses do not comply with strategy.**

FAQ/Comments that the Nutrition Educator/Study Staff may receive and suggested responses (Do not present these to the group, but read through in advance in case they are asked during session):

- “I don’t want my child using a knife. He is too young.” or “I don’t allow anyone else near the stove except for myself.”
 - Let’s think about some other ways your child can help.
- “It makes me crazy to try to get dinner done and have to help them cook” or “I don’t have time or patience for that ” or “my kitchen is too small to have us work together”
 - Is there something small they can help with that will not slow you down too much? What if they helped open the canned goods before you got started?

- It may take longer to prepare the first time your child helps because you may find you are teaching him/her safety lessons along the way (like how to properly use tools/equipment, or not to put meat on same platter as veggies). But in the end, these are valuable lessons that your child is learning and will help him improve over time.
- “My child hates cooking”
 - What activities does your child enjoy doing? If your child likes to play games, is there some way you can make this into a game?
- “We are not home together when vegetables are prepared for meals.”
 - Try to use the strategy when schedules line up, for instance on the weekends when they are more likely to be home for meals and not at practices or other commitments.
 - Prepare vegetables for the next day’s meal

V. Eating Together (Nutrition Educator, 20 minutes)

1. Try to establish a family-like setting for eating.
2. The NE should sit down and enjoy the meal with participants.
3. While eating, discuss the importance of sharing meals as a family.
 - a. **ASK:** What makes it hard for you to eat more meals together? What have you found to be helpful ways to eat together more often?
 - b. Refer to the *Mealtime: It's a Family Thing* handout. Highlight tips for making time to eat meals together and have meaningful conversations. Encourage participants to share ideas that work for their family. Emphasize that eating family meals promotes good eating habits, builds family closeness, encourages cooperation, and helps improve communication skills.
 - c. Ask families what they enjoyed about today's class. Emphasize the importance of working together safely to cook healthy meals that the whole family can enjoy and eating together as a family.
4. Pass out groceries and get families excited about next week’s topics and activities.

SESSION THREE:
MyPlate

Upon Arrival:

- Ask families to check in
- Distribute name tags

Overall Goal for Session:

Parent/child pairs can:

- Parent/child pairs can explain the importance of eating foods from every food group

Strategy Session Goals:

Parents/caregivers:

- Can describe facilitators and barriers for last week's strategy: Child helps prepare vegetables for meals.
- Can demonstrate how to correctly use this week's strategy: Using MyPlate
- Will have a plan for implementing the strategy at a meal the next day.

Objectives:

Families will be able to:

- Classify foods into MyPlate food groups.
- Name the five food groups.
- Explain why it is important to have a balanced diet.

Recipe(s): Baked Flaked Chicken, Brown Rice, Sauteed Greens

I. Introduction (Nutrition Educator, ~5 min)

***The Nutrition Educator should initiate the session by 5 minutes past the official start time of the session and not wait until all participants have arrived.**

1. Welcome families.

“Welcome back everyone. ASK: Did everyone use the groceries we sent home to make the Turkey Tacos? How did it go?”

2. Introduce the lesson.

“Today we’re going to learn about how important it is to eat foods from every food group.

“Let’s get started with the cooking demonstration.”

II. Cooking and Food Safety (Chef and Nutrition Educator, ~50 minutes)

Preparation before Session: The Chef will prepare the Brown Rice and rinse the majority of the greens to be sautéed; leaving only a small portion to be washed by the children.

****The Handouts referenced throughout the lesson do not have to be read in detail, but the Chef and Nutrition Educator should provide enough information to give participants a brief summary of the main ideas from the handout, highlighting the most important aspects.**

During the Cooking demonstration, the classroom assistant and study staff will set up participant preparation stations.

1. (CHEF): Introduce the recipes for the day: **Baked Flaked Chicken, Sautéed Greens, and Brown Rice.** Explain that today we will re-emphasize the food safety practices we learned last week as well as learn about eating foods from every food group.
2. Display the fresh, frozen, and canned vegetables that will be used.
3. The Chef will demonstrate the entire preparation of BOTH recipes: Baked Flaked Chicken and Sautéed Greens.

*****The demo should take < 25 minutes.**

4. The Nutrition Educator will stand beside the Chef in the kitchen while s/he demonstrates, incorporating appropriate elements of the Nutrition Lesson (MyPlate). For example,
 - When the chicken is being prepared with the whole grain flakes, the Nutrition Educator can point out that this item covers two groups on the MyPlate: protein and grain sections.
 - When the sautéed greens are being prepared, the Nutrition Educator can point out that this vegetable covers the vegetable section of the plate.
5. While the demonstration is taking place the Nutrition Educator will:
 - Briefly explain the importance of these food safety practices: 1) wiping the tops of cans, 2) inspecting frozen products, and 3) rinsing fresh produce that will be used in the recipes. ***Have children wipe the tops of cans, inspect frozen products and assist with the rinsing of the remaining portion of greens.**

- While children help, discuss convenient ways to prepare vegetables. Refer to the *Cooking Produce* handout.

Participant Preparation of Food (< 25 minutes)

1. Have families wash their hands, using proper technique, in preparation for cooking today's recipes. *NOTE if Cooking Demo is running longer than 25 minutes, the Nutrition Educator may initiate the washing of hands during the demo, directing small groups at a time to the hand washing stations.
2. Group several parent-child pairs into cooking teams and assign each team tasks, delegate different steps in the recipe, noting which steps children can take on themselves. Walk around the room, answering any questions and commenting on technique.
3. The participants will prepare the Baked Flaked Chicken and Sautéed Greens. **However, the sautéing of the greens they wash and cut will not take place until right before families eat together**; that is, following the Strategy Session. Study staff will end the children-only activity earlier than the Strategy Session part (adults only) and have several children assist the Chef in sautéing the greens.
4. **Note for CHEF:** Since there will be ~40-45 minutes between the end of the Participants preparation of food and before the Eating Together parts and the chicken will take less time to bake (20-25 min), the Chef should keep the chicken warm in the oven at 140° until the participants are ready to begin the meal.

Upon completion of food preparation, the Nutrition Educator will ask participants to sit down at the tables for the Nutrition Lesson.

III. Nutrition (Nutrition Educator, <20 minutes)

****Some items from the Nutrition Lesson have been incorporated during the Cooking Demonstration. The remaining content can be covered at this time.**

1. Display the MyPlate poster and ask families what they already know about MyPlate. Refer them also to the *MyPlate* handout in their packet.
 - a. Point out that MyPlate helps guide us to make smart food choices. Emphasize the benefits of healthy eating for children, such as reaching full growth potential, peak physical performance, peak brainpower, and protection from many chronic diseases.
 - b. **ASK:** What are the five food groups? Why is it important to eat from all five? Explain that all food groups are important for our health, providing us a *balanced* diet and important vitamins and nutrients. Suggest that families try to eat foods from every food group"
 - c. **ASK:** Are some food choices better than others within the food groups? For example, like a french fries in the vegetable group, white rice vs. brown rice.
 - d. **ASK:** What do you notice about the way food is served on MyPlate (e.g., half of the plate is for fruits and vegetables, a quarter for grains, and a quarter for protein, with a glass on the side for dairy)?

- e. **ASK:**How does this compare to the way you usually serve your plate and your child’s plate?
- f. **ASK:**What does MyPlate tell us about which food groups should make up the base of our diet?
- g. **ASK:** How can MyPlate help you think about making healthy choices when you're planning and preparing a mixed dish like pizza or tacos? Point out that MyPlate is a symbol that helps remind us how to build a healthy diet - not an exact replica of our plate at each meal. Guide families to break down a mixed dish (using food models or pictures) like tacos into food groups (Refer to the Turkey Taco recipe that was used in Lesson One. Then, have them suggest ideas for adjusting the amount of each ingredient to follow MyPlate themes, such as topping the taco with lots of veggies and smaller amounts of proteins.

****At this point the Nutrition Educator will initiate a mini-break where the children will be grouped separately from their parents. They will be ‘entertained’ with an activity (not based on a nutrition topic) led by a study staff member.**

“Now the children and parents will be separated to complete different activities. The children will enjoy activities led by a member of our study team while the parents will stay here and have a separate lesson.”

The tables where the parents sit should be rearranged so they sit as closely as possible ‘around’ a table or a small space.

*****NOTE FOR TIMING:** Study staff should limit the child-only activity to ~ 10 minutes, ending it while the parents are still participating in their separate lesson. The study staff should direct 2 of the children back to the Chef/kitchen to assist with sautéing the greens. The remaining children can start fixing the serving dishes/bowls of the **Baked Flaked Chicken, Sautéed Greens, Brown Rice** that they can bring to the table to enjoy family-style after the parents are finished with their lesson. A serving dish/bowl should serve ~4 people.

IV. Discussion of Strategy: Using MyPlate (Nutrition Educator, ~20 minutes)

1. Survey about last week’s strategy: Child helps prepare vegetables for meals.

“Last week, I mentioned that this week we would talk about how you used last week’s strategy before we introduce this week’s strategy. Before we talk about it, we are asking you to fill out a short survey about what you did last week. It should only take a few minutes.”

At this point, a study staff member will pass out the paper survey and pens and ask parents to complete the survey. This is the first time parents are being asked to complete the survey, therefore the study staff member needs to read the directions to the group, describe the response options, and ask if there are any questions.

After the parents complete the survey, thank them.

“As mentioned last week, we will be recording this part of the lesson because your responses and input are so valuable to this research study. We don’t want to miss any of your comments

about how you used the strategy last week. It works better for us if we record this instead of having an extra person here to take notes. We truly appreciate your contribution and please know it directly impacts the study's results and goals. Because we are recording, please try not to talk while others are talking so the recording is easier to hear.

At this point, a study staff member will start an audio recording.

2. Discussion about last week's strategy: Child helps prepare vegetables for meals.

The Nutrition Educator will facilitate the lesson making sure to ask all the questions below. The goal is to encourage feedback about what helped participants use the strategy or what kept participants from using the strategy during the past week. The Nutrition Educator will go around the table and ask EACH participant the following questions and encourage each participant to give thorough and thoughtful answers:

- **ASK:** How did you use last week's strategy: Have child help you prepare the vegetables for meals?
 - **ASK:** What helped you use it?
 - **ASK:** What kept you from using the strategy?

When everyone has had a chance to respond,

- **ASK:** Do you have any other comments about using the strategy of having your child help prepare vegetables for meals

3. Introduction of this week's strategy: Using MyPlate

Show parents the plastic MyPlate: *"This plate shows how much of the plate should be covered with vegetables compared with the other food groups. **Your strategy for this week is to use these plates when you eat your meals together as a family.** We will include several of these plates in your grocery bag that you take home tonight, that way others in your family can use these plates too. When you use the plates, please do not tell your children that you are using the plates to get them to eat more vegetables."*

Tell: "Here are some ways to use MyPlate at home this week (use food models to illustrate)."

1. Put cooked or raw carrots on the vegetable part of the plate.
2. If you serve a mixed dish like lasagna, talk about the amount of vegetables that you think would be on the vegetable part.
3. Serve the foods that are part of tacos in separate compartments, with the tortilla as the grain, meat/beans/cheese as the protein, and lettuce and tomato as the vegetable and have your child put it together.
4. Serve the foods that are part of hamburgers in separate compartments, with the bun as the grain, the patty as the meat and lettuce, tomato, cucumber or avocado as the vegetable and have your child put it together.

4. CLARIFY the strategy:

"Let's make sure that we are all clear about what we asking you to do for this strategy. We want you to have your family, including your child in this class with you, use the MyPlates for meals at home."

ASK: What questions do you have about using this strategy?

ASK: What problems do you expect when you use this strategy?

Nutrition Educator will ask each participant the following questions before ending this portion:

- **ASK:** How are you planning to use these plates for a meal at home tomorrow? What is the meal you have planned and where will each item go on the plates you will use?

****Nutrition Educator should gently correct if responses do not comply with strategy.**

Remember, next week will be asking each one of you how easy or hard it was to use MyPlates and what made it easy or hard.

FAQ/Comments that the Nutrition Educator may receive and suggested responses (Do not present these to the group, but read through in advance in case they are asked during session):

- If your child asks why are we using this plate--just be honest and say it's a good guide reminding us to eat from the five food groups AND how much of each group we should be eating. Portion size!
- If you don't have fruit or don't want to serve fruit, you can put extra vegetables on that portion of the plate.
- Encourage the whole family to use the plates so the child does not feel singled out.
- You may want to have your child put the different foods in each section himself so s/he has a hand in 'creating' her/his plate, where they get to figure out what food goes where.
- "This is a baby/kid plate"
 - Consider using the plate as guide in distributing food.
- "What if we have soup"
 - If vegetables must be served in a bowl, such as tomato soup, consider placing a cup of soup over the vegetable area of the plate.
- "What do I do with mixed dishes like stir-fry or casseroles?"
 - For mixed dishes, the plate can be used as a guide to show which food groups should be used in the recipe. For example, if you were cooking lasagna, you can imagine the noodles would be in the grain group, the meat in the protein group and the tomatoes and spaghetti sauce in the vegetable group.

V. Eating Together (Nutrition Educator, 20 minutes)

1. Try to establish a family-like setting for eating.
2. The Nutrition Educator should sit down and enjoy the meal with participants.
 - While they are eating, discuss simple ways families can incorporate more vegetables into their meals. Refer to the ***Adding Vegetables to Meals*** handout.
 - Ask families what they enjoyed about today's class. Summarize the key message: choose foods from every food group"
3. Pass out groceries and get families excited about next week's topics and activities.

SESSION FOUR:
Food Labels and Healthy Choices
Upon Arrival:

- Ask families to check in
- Distribute name tags

Overall Goal for Session:

Families will:

- Prepare more meals and snacks at home containing vegetables.
- Regularly read food labels to identify healthy snacks and convenience foods.

Strategy Session Goals:

Parents/caregivers will be able to:

- Describe facilitators and barriers to last week's strategy: Using MyPlate.
- Demonstrate how to correctly use this week's strategy: Making vegetables more available and visible than the other foods of the meal.
- Will have a plan for implementing the strategy at a meal the next day.

Objectives:

Families will be able to:

- Use food labels to identify healthier options.
- Identify healthy snacks that include foods from at least two food groups.
- Evaluate versions of popular convenience foods for healthfulness.

Recipe(s): Salmon Pasta Bake, Orange Glazed Carrots

I. Introduction (Nutrition Educator, ~5 minutes)

1. Welcome families.

"Welcome back!" ASK: Were you able to make the Baked Flaked Chicken last week along with the side items sent home in the take-home grocery bag?

2. Introduce the lesson.

"Today we will discuss ways to prepare more meals and snacks at home as well as how valuable it is to read food labels."

"Let's get started with the Cooking Demonstration."

II. Cooking and Food Safety (Chef and Nutrition Educator, ~ 45 minutes)

Preparation in the hour before Session: The Chef will prepare the pasta. *Instead of reducing 1 cup of OJ, use a ¼ cup frozen orange juice concentrate per 4 servings

****The Handouts referenced throughout the lesson do not have to be read in detail, but the Chef and Nutrition Educator should provide enough information to give participants a brief summary of the main ideas from the handout, highlighting the most important aspects.**

During Chef demonstration, classroom assistant and study staff will set up participant preparation stations.

1. (CHEF) Introduce the recipes for the day: **Salmon Pasta Bake and Orange Glazed Carrots**. Explain we will be highlighting cooking techniques and substitutions that help increase vegetables in meals. For example, the addition of peas to the salmon pasta bake. Additions like this can make dishes taste better, be healthier and even go unnoticed.

2. The Chef will demonstrate the entire preparation of BOTH recipes: **Salmon Pasta Bake and Orange Glazed Carrots**.

*****The demo should take < 25 minutes.**

3. The Nutrition Educator will stand beside the Chef in the kitchen while s/he demonstrates incorporating elements of the Nutrition Lesson that are appropriate (e.g., *Reading Food Labels* and *Eating Smart with Eating Convenience Foods* handouts). For example,

- Talk about the bag of peas and bag of whole wheat pasta and point out the elements of the nutrition label.

4. While the demonstration is taking place, the Nutrition Educator will refer to the *Healthy Cooking Ideas* handout. Point out simple substitutions families can make to their favorite recipes.

5. (CHEF) Explain that we've been discussing healthier versions of meals. Point out steps to increase veggies in convenience foods like putting veggies on frozen pizza, adding veggies to macaroni and cheese or spaghetti sauce.

Participant Preparation of Food (< 20 minutes)

1. Have families wash their hands, using proper technique, in preparation for cooking today's recipes. *NOTE if Cooking Demo is running longer than 25 minutes, the Nutrition Educator may initiate the washing of hands during the demo, directing small groups at a time to the hand washing stations.
2. Group several parent-child pairs into cooking teams and assign each team tasks, delegate different steps in the recipe, noting which steps children can take on themselves. Walk around the room, answering any questions and commenting on technique.

Upon completion of food preparation, the Nutrition Educator will ask participants to sit down at the tables for the Nutrition Lesson.

III. NUTRITION (Nutrition Educator, < 15 minutes)

****Some items from the Nutrition Lesson have been incorporated during the Cooking Demonstration. The remaining content can be covered at this time.**

1. Introduce the food label. Explain how labels and the Nutrition Facts panel can help guide our choices about packaged foods and snacks.

2. **ASK:** What do you usually eat for a snack? Why? Lay out empty packages of the following snack foods (potato chips, veggie chips, baby carrots, frozen peas) on the table in front of families. Explain that we are going to take a closer look at common snack foods to determine how healthy they are, but first we need to know how to interpret food labels.
3. **ASK:** What information on the food label or Nutrition facts panel do you already use?
4. Refer to the **Reading Food Labels** handout. Emphasize that the % DV tells us whether the food is high or low in a nutrient-20% or more is high, 5% or less is low. Point out which nutrients we want more or less of. Clarify the difference between one serving and the number of servings provided in a package.
5. **ASK** each family to pick up a snack package from the table and work together to determine whether their product is high or low in various nutrients. Tell them to pay close attention to the fat, calories, sugar, and sodium. Have families compare the calories and fat in one serving to the entire package.
6. Call on children to report their families' findings as you ask questions such as:
 - **ASK:** Are you surprised by how many servings are in one package? **ASK:** How much would you normally eat? **ASK:** Is your snack high in any nutrients? Which ones? **ASK:** Are these nutrients we want to eat more or less of? **ASK:** Which snacks are better for you?
7. Explain that families can often make healthier snack choices by making their own snacks at home. Refer to the **Snack Smart** handout. Point out that a good rule of thumb is to include at least two food groups in snacks. Have parents and children work together to come up with healthy snacks using ideas on the handout or ideas of their own.
8. Explain that similar to prepackaged snacks, other convenience foods are typically less healthy.
9. **ASK:** Have you heard the term "convenience foods"? **ASK:** What does it mean to you? Acknowledge responses and explain that, in this course, we use the term "convenience foods" to refer to any foods that you have not cooked at home yourself using basic ingredients (e.g., granola bars, ready-to-eat cereals, frozen vegetables, yogurt, candy bars, packaged cookies, prepackaged meals, takeout or fast food). **ASK:** What types of convenience foods do you usually eat, and why?
10. Refer to the **Eating Smart When Eating Convenience Foods** handout. **ASK:** How can you use what you've learned so far in this course to make smarter choices when eating convenience foods? Engage kids by discussing healthier kids' menu options such as a side of baby carrots instead of fries, or low-fat milk instead of soda.

*****At this point the nutrition educator will initiate a mini-break where the children will be grouped separately from their parents. They will be 'entertained' with an activity (not based on a nutrition topic) led by a study staff member.***

The tables where the parents sit should be rearranged so they sit as closely as possible 'around' a table or a small space.

*****NOTE FOR TIMING:** Study staff should limit the child-only activity to ~ 10 minutes, ending it while the parents are still in their separate lesson. The study staff should direct the children to start filling the serving dishes for Salmon Pasta Bake and Orange Glazed Carrots, so that they can bring these serving dishes to the table to enjoy family-style after the parents are finished with their lesson. They can also put out napkins forks, etc.

IV. Discussion of Strategy: Making vegetables more available and visible than the other foods (Nutrition Educator, ~ 25 minutes)

1. Survey about last week's strategy: Using MyPlate

“Last week, I mentioned that this week we would talk about how you used last week's strategy before we introduce this weeks strategy. Before we talk about it, we are asking you to fill out a short survey about what you did last week. It should only take a few minutes.”

At this point, a study staff member will pass out the paper survey and pens and ask parents to complete the survey.

After the parents complete the survey, thank them.

“As mentioned last week, we will be recording this part of the lesson because your responses and input are so valuable to this research study. We don't want to miss any of your comments about how you used the strategy last week. It works better for us if we record this instead of having an extra person here to take notes. We truly appreciate your contribution and please know it directly impacts the study's results and goals. Because we are recording, please try not to talk while others are talking so the recording is easier to hear.”

At this point, a study staff member will start an audio recording.

2. Discussion about last week's strategy: Using MyPlate

The Nutrition Educator will facilitate the lesson making sure to ask all the questions below. The goal is to encourage their comments with the following open-ended questions that prompt participants to think about the ease and barriers of the strategy discussed. The Nutrition Educator will go around the table and ask each participant the following questions and encourage each participant to give thorough and thoughtful answers:

- **ASK:** How did you use the strategy last week: Using MyPlate?
 - **ASK:** What helped you use it?
 - **ASK:** What kept you from using the strategy?

When everyone has had a chance to respond,

- **ASK:** Do you have any other comments about using MyPlate?

3. INTRODUCE this week's strategy: Making vegetables more available and visible than the other foods of the meal.

“This strategy is all about making the vegetables the ‘center’ of the meal. This means that after preparing the plates of food for your family and sitting down to eat, keep the extra vegetables on the table (or wherever you are eating) during the meal, but keep any extras of the other foods in another room and/or out of sight.

“The key is to be sure to put all the extras of the other foods of the meal: extra main dish (e.g., meat), extra breads or other starches, and extra dairy, away from the dinner table or wherever the meal is taking place.”

If you prepare meals that are mainly stews or mixed dishes/casseroles, then you might serve a salad or another vegetable in addition to the mixed dish. The only extra food on the table would be extra salad or extra vegetable that the children can easily dish onto their plate for seconds/thirds.”

“The simple idea behind the strategy is that by making only the vegetables available and visible at the table, it is more likely your child will eat more of the vegetables. It will be easier to just dish up more of the readily available vegetables than to get up and get more of another type of food.

SAY: “Here are some additional tips for using the strategy:

1. Have your child bring the pan or serving dish of vegetables to the table. This way they are aware it’s there right away.
2. If you have served hot dogs, baked beans, and corn have a bowl of extra corn on the table. Any extra hot dogs would remain on the kitchen counter or stove.
3. If you serve spaghetti with salad, have extra salad and perhaps extra sauce on the table.

4. CLARIFY the strategy:

“Let’s make sure that we are all clear about what we asking you to do for this strategy. The goal is for the extra vegetables to be more available and visible to the child than the other foods. The extras of the other foods will be “out of sight-out of mind.”

ASK: What questions do you have about using this strategy?

ASK: What problems do you expect when you use this strategy?

The Nutrition Educator will ask each participant the following question(s) before ending this portion:

- **ASK:** What vegetables do you have planned for a meal tomorrow?
- **ASK:** Since your vegetables will be the only extra food left on the table during the meal, where will you place the other foods of the meal?
- **ASK:** How will you serve the extra vegetables? On another plate, serving bowl, the pan they were heated in?

****Nutrition Educator should gently correct if responses do not comply with strategy.**

Remember, next week will be asking each one of you how easy or hard it was to use this strategy and what made it easy or hard. We will practice this strategy for the meal tonight so you can see one way to do it. We will have both Carrots and the Salmon Pasta Bake on the table at the start of the meal, then we will remove the Salmon Pasta Bake and place it away from the table, but we will be leaving the carrots on the table within close reach. We will also pass them around again since having a bowl of veggies in your hand and a spoon to dish them out, is a way of making them VERY available.

FAQ/Comments that the Nutrition Educator may receive and suggested responses (Do not present these to group, but read through in advance in case they are asked during session):

- **Why are the vegetables on the table?** Answer: “They’ll be right on the table so it will be easy for us to get more.”
- **If your child asks for more of the other foods:** Answer: “How about we try and finish what’s out here on the table first.” If they insist, they can go serve themselves extras from the kitchen.
- **We don’t eat at a dinner table.** Answer: “ If so, that works too for this strategy. All you have to do is place the vegetables and no other foods out on the side table or coffee table so that they are easily accessible by your child. If you have a spare TV tray, place the vegetables on it, while the extras of other foods in the meal go back in the kitchen.”

V. Eating Together (Nutrition Educator, ~20 minutes)

****REMEMBER to only have the Orange Glazed Carrots left at the table where the participants are eating. Bring the Salmon Pasta Bake to another part of the room after people have initially dished up their portion.**

1. Try to establish a family-like setting for eating.
 2. The Nutrition Educator should sit down and enjoy the meal with participants.
 3. While everyone is eating, acknowledge the reasons families eat convenience foods, but encourage them to consider the tradeoffs. Summarize key message regarding food labels and note the ideas below.
 - **Taste:** Healthier, tasty versions of convenience-food favorites can be made at home. Highlight recipe(s) made today: Salmon Bake—the addition of peas adds a healthy option.
 - **Cost:** Explain that many convenience foods can actually be made at home for less money, especially if you maintain a basic pantry. We will work more on that in later classes.
 - **Time:** Explain that next week, we are going to learn how to plan ahead and save time in the kitchen so we are less dependent on convenience foods in a crunch.
3. Pass out groceries and get families excited about next week’s topics and activities.

SESSION FIVE:
The Power of Planning
Upon Arrival:

- Ask families to check in
- Distribute name tags

Overall Goal for Session:

Families will:

- Plan and prepare quick, healthy meals at home

Strategy Session Goals:

Parents/caregivers will be able to:

- Discuss facilitators and barriers for last week's strategy: make vegetables more available and visible than the other foods of the meal.
- Demonstrate how to correctly use this week's strategy: Serve at least 2 vegetables with meals.
- Have a plan for implementing the strategy at a meal the next day

Objectives:

Families will be able to:

- Plan a family meal using menu planning lesson handout.
- Use practices to save time when making meals at home.
- Making simple recipe changes to improve healthfulness of meals.

Recipe(s): Chinese Veggies and Rice, Steamed Green Beans

I. Introduction (Nutrition Educator, ~5 minutes)

***The Nutrition Educator should begin the session by 5 minutes past the official start time of the session and not wait until all participants have arrived.**

1. Welcome families.

*“Welcome back everyone. **ASK:** Were you able to use food labels to help make smart snack choices? **ASK:** Were you able to make a convenience food healthier by adding vegetables?”*

2. Introduce the lesson.

“Today we will practice planning meals as a family, saving time in the kitchen, and making simple recipe changes.”

“Let’s get things started with the cooking demonstration.”

II. Cooking and Food Safety, (Chef and Nutrition Educator (Nutrition Educator), ~45 min)

****The Handouts referenced throughout the lesson do not have to be read in detail, but just enough to give participants the general gist of the handout, highlighting the most important aspects.**

During the Cooking demonstration, the classroom assistant and study staff will set up participant preparation stations.

- **(CHEF)** Introduce the recipes for the day: Chinese Veggies and Rice and Steamed Green Beans. Explain that today we are going to learn how to save time in the kitchen and to practice using recipe frameworks.
- The Chef will demonstrate the entire preparation of BOTH recipes: Chinese Veggies and Rice and Steamed Green Beans.

*****The demo should take <25 minutes.**

- The Nutrition Educator will stand beside the Chef during the demonstration while s/he demonstrates incorporating elements of the Nutrition Lesson that are appropriate. For example,
 - Discuss factors like available ingredients, the season, healthier cooking methods, and taste preferences as reasons for altering the specific ingredients in a casserole/mixed dish.
 - Discuss menu planning and refer to ***Menu Planning Basics*** handout. **ASK:** Do you plan menus in advance?**ASK:** How can menu planning help us eat more like MyPlate?
 - **Refer to the *Stocking Your Kitchen*** handout. Point out that maintaining a supply of basic components of dishes will help families save time by putting together quick meals using foods already on hand.
- **(CHEF)** Refer to the ***Cook It Up Quick*** handout. Point out additional time saving strategies participants can use. Encourage families to come up with ideas that they’d like

to try at home, or to adopt new ideas. **Call** on kids to suggest ways they can help their parents in the kitchen to make the cooking go faster. **ASK:** What ideas do you have for saving time in the kitchen?

- **(CHEF) ASK:** What are some examples of ways you are already using the freezer to save time?
- **(CHEF)** Emphasize safe ways to defrost frozen foods.
- Explain that families will practice using recipe frameworks while preparing the recipes for today. Reassure families that, as they develop confidence cooking, their ability to make simple recipe adjustments will improve.
- **(CHEF)** Demonstrate the stove-top steaming method with the green beans.

Participant Preparation of Food (<20 min)

1. Have families wash their hands, using proper technique, in preparation for cooking today's recipes. *NOTE if Cooking Demo is running longer than 25 minutes, the Nutrition Educator may initiate the washing of hands during the demo, directing small groups at a time to the hand washing stations.
2. Group several parent-child pairs into cooking teams and assign each team tasks, delegate different steps in the recipe, noting which steps children can take on themselves. Walk around the room, answering any questions and commenting on technique.

Upon completion of food preparation, the Nutrition Educator will ask participants to sit down at the tables for the Nutrition Lesson.

III. Nutrition (Nutrition Educator, ~20 minutes)

*****Some items from the Nutrition Lesson have been incorporated during the Cooking Demonstration. The remaining content can be covered at this time.***

1. Lead families in a simple menu planning exercise.
2. **ASK:** Do you plan menus in advance? How can menu planning help us eat better? Point out that advance planning can help you be sure you always have healthy foods on hand (MAY have already covered this in cooking demo). The farther in advance you plan, the healthier your meals will be.
3. Point out that planning helps to avoid waste.
4. Refer to ***Menu Planning Basics*** handout. Point out simple tips for planning menus as a family.
5. Give parent-child teams time to plan at least one meal they would like to make together this week, using the questions outlined on the handout. After 2 minutes, ask several children to share their families' ideas.
6. We will have an extra Menu Plannin Basics form for child to complete and we will keep for next week.
7. **ASK:** What's good about having everyone share in the planning? Emphasize that family menu planning gets everyone excited about the meals and allows families to share in the responsibilities and fun.

8. Ask several families to share some of the ingredients they might need for the meal they just planned. **ASK:** What would you do if you went to the store and they were out of one of your ingredients?
9. Acknowledge responses and guide families to understand that many recipes do not need to be followed exactly. Most recipes are meant to provide a framework that can be adjusted based on several factors.
10. Discuss factors like available ingredients, the season, healthier cooking methods, and taste preferences (may have already touched on this during cooking demo).
11. Explain that menu planning using recipe frameworks helps you manage your food resources because you can plan to use up ingredients you have on hand, use ingredients purchased in bulk across several meals, and take advantage of sales you see at the store.
12. Elaborate on recipe frameworks as you refer to the *Design your own casseroles* handout. Point out that families can use the table on the Casserole Handout to ensure they are making well-balanced casseroles as well as encouraging them to think about tasks for their child.
13. **(Nutrition Educator) Refer to the *Stocking Your Kitchen* handout.** Point out that maintaining a supply of basic components of dishes will help families save time by putting together quick meals using foods already on hand. **ASK** parents and children: Name vegetables that are already on hand at home and suggest modifications to make to the Chinese Veggies and Rice recipe using those vegetables.

*****At this point the Nutrition Educator will initiate a mini-break where the children will be grouped separately from their parents. They will be ‘entertained’ with an activity (not based on a nutrition topic) led by a study staff member:***

“Now the children and parents will be separated to complete different activities. The children will be enjoy activities led by a member of our study team while the parents will stay here and have a separate lesson.”

The tables where the parents sit should be rearranged so they sit as closely as possible ‘around’ a table or a small space.

****NOTE for TIMING:** Study Staff should limit the child-only activity to <10 minutes ending it before the parents are still in their separate lesson. The study staff should direct the children to start fixing the serving dishes/bowls of Chinese Veggies and Rice and steamed green beans so that they can bring the serving dishes/bowls to the table to enjoy family-style after the parents are finished with their separate lesson.

IV. Discussion of Strategy: Serve at least 2 vegetables with the meal (Nutrition Educator, ~20 min)

1. Survey about last week’s strategy: Making vegetables more available and visible than the other foods of the meal.

“Last week, I mentioned that this week we would first talk about how you used last week’s strategy which was making vegetables more available and visible than the other foods. Before we

have a discussion, we are asking you to fill out a short survey about what you did last week. It should only take a few minutes.”

At this point, a study staff member will pass out the paper survey and pens and ask parents to complete the survey.

After the parents complete the survey, thank them.

“Thank you for completing the survey, now we will have our discussion. As in all the previous weeks, we are recording our conversation so we don’t miss any of your valuable comments about how you used the strategy last week. It works better for us if we record this instead of having an extra person here to take notes. We truly appreciate your contribution and please know it directly impacts the study’s results and goals. Because we are recording, please try not to talk while others are talking so the recording is easier to hear.

At this point, a study staff member will start an audio recording.

2. Discussion about last week’s strategy: Making vegetables more available and visible than the other foods of the meal

The Nutrition Educator will facilitate the lesson making sure to ask all the questions below. The goal is to encourage feedback about what helped participants use the strategy or what kept participants from using the strategy during the past week. The Nutrition Educator will go around the table and ask EACH participant the following questions and encourage each participant to give thorough and thoughtful answers:

- **ASK:** How did you use last week’s strategy: **Making vegetables more available and visible than the other foods of the meal?**
 - **ASK:** What helped you use it?
 - **ASK:** What kept you from using the strategy?

When everyone has had a chance to respond,

- **ASK:** Do you have any other comments to make about making vegetables more available and visible than the other foods of the meal?

3. INTRODUCE this week’s strategy: Serve at least 2 vegetables with the meal.

For the Nutrition Educator: Bring Food Models to help demonstrate this strategy.

“Serving 2 vegetables with a meal can be done in two ways. First, you can serve 2 different vegetables as side dishes. Second, you can serve 1 side dish of vegetables AND 1 mixed in a casserole/mixed dish. (Show poster and refer to handout). For example, the vegetables in today’s recipe - Chinese Veggies and Rice count as 1 vegetable serving. When you add a side of green beans (like we’ll be doing in the meal today) you will be practicing this strategy.”

“Let’s say you serve a salad that has carrots, lettuce and tomato. That salad counts as 1 vegetable. You would have to serve another veggie in addition to that salad in order to practice this strategy.”

“Another similar example uses a can of mixed vegetables. If you served mixed vegetables as a side dish to turkey tacos, you would be serving at least 2 veggies in the meal.”

Here are some other easy and popular recipes that use this strategy:

- Macaroni and cheese mixed with peas and a side of collard greens
- Hamburgers with a side of baby carrots and side of broccoli
- Spaghetti with tomato sauce and a side of green beans

4. CLARIFY the strategy:

“Let’s make sure that we are all clear about what we asking you to do for this strategy. There are TWO ways to practice this strategy: 1. Serving at least 2 vegetable side dishes OR 2. having a mixed dish that has veggies mixed in PLUS a side dish of just veggies.”

ASK: What questions do you have about using this strategy?

ASK: What problems do you expect when you use this strategy?

Nutrition Educator will ask each participant the following questions before ending this portion:

- **ASK:** What 2 vegetables do you have planned for a meal at home tomorrow? Will it be a mixed dish that includes vegetables PLUS a side dish of vegetables OR 2 side dishes of vegetables?
- **ASK:** What 2 vegetables do you have on hand that you could use at the meal after tomorrow?

****Nutrition Educator should gently correct if responses do not comply with strategy.**

Remember, next week will be asking each one of you how easy or hard it was to use this strategy and what made it easy or hard. I think you’ll see it may be easier than you think.

FAQ/Comments that the Nutrition Educator may receive and suggested responses (Do not present these to group, but read through in advance in case they are asked during session):

- “I don’t have enough time to prepare 2 vegetables for meals”

Answer: “For some, the thought of preparing 2 vegetables may seem like a bigger time commitment than they have in preparing the meal. However, again going back to planning you may find it’s not as time consuming as you think. For example, find a main dish with a serving of vegetables in it and simply add a side dish of canned corn or fresh carrots. And remember it can be any form of veggies: fresh, canned, or frozen.

V. Eating Together (Nutrition Educator, ~20 minutes)

1. Try to establish a family-like setting for eating.
2. The Nutrition Educator should sit down and enjoy the meal with participants.
 - While everyone is eating, ask families what they enjoyed about today’s class.
Summarize the key message from this class:

- Families can plan menus using everyone's ideas.
- Ways to save time in the kitchen include planning in advance so you have ingredients on hand, using frozen or canned vegetables, prepare ahead of time and freeze and keep your kitchen organized.
- Using recipe frameworks with simple changes can help you make healthy meals at home.

3. Pass out groceries and get families excited about next week's topics and activities.

SESSION SIX:
Shopping Smart for Vegetables
Upon Arrival:

- Ask families to check in
- Distribute name tags

Overall Goals for Session:

Families will:

- Make smart choices when shopping for vegetables, including what to buy, when, where and how.

Strategy Session Goals:

Parents/caregivers will be able to:

- Describe facilitators and barriers for last week's strategy: Serve at least 2 vegetables with meals.
- Demonstrate how to correctly use this week's strategy: Serve vegetables before meals.
- Have a plan for implementing the strategy at a meal the next day.

Objectives:

Families will be able to:

- Identify benefits of shopping smart for vegetables.
- Use appropriate methods to stretch food dollars when shopping for or storing vegetables:
 - Use specific methods for specific vegetables to reduce waste (i.e., how to tell when veggies go bad)
 - Use different forms of veggies to optimize savings
 - Buy in season, in bulk/when on sale, with a shopping list

Recipe(s): Veggie Wraps

I. Introduction (Nutrition Educator, ~5 minutes)

***The Nutrition Educator should initiate the session by 5 minutes past the official start time of the session and not wait until all participants have arrived.**

1. Welcome everyone back. **ASK:** "What was in the meal that you planned? Did your child help with the planning?"

2. Introduce the lesson.

"Today we're going to focus on grocery shopping for vegetables. This lesson is a good follow-up to last week's lesson about meal planning because shopping and meal planning go hand-in-hand."

"Let's get things started with the cooking demonstration."

II. Cooking and Food Safety (Chef and Nutrition Educator (Nutrition Educator), ~45 minutes)

****The Handouts referenced throughout the lesson do not have to be read in detail, but the Chef and Nutrition Educator should provide enough information to give participants a brief summary of the main ideas from the handout, highlighting the most important aspects.**

During the Cooking demonstration, the classroom assistant and study staff will set up participant preparation stations.

1. (CHEF) Introduce the recipe for the day: Veggie Wraps. Explain we will be talking about how to get the most out of your vegetables when it comes to shopping, storing and cooking.
2. Display the vegetables used in the meal.
3. The CHEF will demonstrate the complete preparation of the Veggie Wrap recipe.

*****The demo should take <25 minutes.**

4. The Nutrition Educator will stand beside the Chef during the demonstration while s/he demonstrates incorporating elements of the Nutrition Lesson that are appropriate. For example,
 - a. Refer to the *Minnesota Grown Seasonal Produce* handout as the CHEF is preparing the vegetables for the wrap.
5. For each vegetable, the CHEF should discuss:
 - a. the quality of the vegetable,
 - b. how to best store (how to avoid waste, when best to eat, trimming of bad parts, and
 - c. the different forms (fresh, frozen, canned)
6. (CHEF) Explain how to cook dried beans.
7. **ASK:** Where can you find these ingredients in the grocery store—what sections? Point out that these sections are on the perimeter of the store.

Participant Preparation of Food (<20 min)

1. Have families wash their hands, using proper technique, in preparation for cooking today's recipes. *NOTE if Cooking Demo is running longer than 25 minutes, the Nutrition Educator may want to initiate the washing of hands during the demo, directing small groups at a time to the hand washing stations.
2. Group several parent-child pairs into cooking teams and assign each team tasks, delegate different steps in the recipe, noting which steps children can take on themselves. Walk around the room, answering any questions and commenting on technique.

Upon completion of food preparation, the Nutrition Educator will ask participants to sit down at the tables for the Nutrition Lesson.

III. Nutrition (Nutrition Educator, ~20 minutes)

**Staff will place several bowls of fresh ready to eat veggies at the tables where the adults and children will have the nutrition lesson. The Nutrition Educator should let the participants know to “help themselves” to the vegetables. This is incorporating the strategy of the week: serve vegetables before the meal. We should have a bowl for each child/adult pair. These vegetables will be more accessible if they don't need to be ‘passed around.’

****Some items from the Nutrition Lesson have been incorporated during the Cooking Demonstration. The remaining content can be covered at this time.**

“Today we’re going to talk about important influences on cost of vegetables including whether the vegetable is in season, whether it is canned, fresh or frozen, where you buy or get the vegetables, whether the vegetable is on sale or if coupons are available, and how to store vegetables to reduce waste.”

1. Refer to the **Minnesota Grown Seasonal Produce** handout. Discuss how buying seasonal vegetables helps reduce costs.
2. Discuss Storage of Vegetables. Storage of vegetables directly impacts your grocery lists and in turn reduces costs. If you store vegetables the recommended way, it can save time (i.e., trips to the store), money (buy when on sale) and avoids waste. Refer to the **Mold Safety** and **Produce Shelf Life** handouts.
3. Discuss the following vegetables and the best way to store them: (i.e., how to tell when they’ve gone bad)
 - a. Tomatoes
 - b. Leafy Greens
 - c. Cucumber
 - d. Onion
 - e. Sweet Potato
 - f. Avocado
 - g. Carrots
4. Using the menu you planned last week, make a shopping list. (Distribute the menu planning handouts the child filled out last session)
5. **ASK:** What vegetables are on your lists?
6. **ASK:** When you shop, what are some ways you can get the best bargain for these vegetables? Mention Buying in Bulk and on Sale.
7. Refer them to the **Shopping Smart for Vegetables Tips** handout
8. **ASK:** How does the form of the vegetable affect its cost, whether it is canned, fresh or frozen?
 - a. Cheapest: Canned
 - b. Mid: Frozen
 - c. More Expensive: Fresh
9. Discuss Shopping Lists. Point out that shopping with a list helps you avoid impulse buys, stick to your budget, spend less time and money at the store, and account for what you have on hand.

10. Stress the importance of taking inventory before shopping.
11. **ASK:** Who makes shopping lists?
12. **ASK:** If you do, do you find that they save you time and money?
13. **ASK:** If you don't, why?
14. **ASK:** How can children help you with your shopping list?

****At this point the Nutrition Educator will initiate a mini-break where the children will be grouped separately from their parents. They will be 'entertained' with an activity (not based on a nutrition topic) led by a study staff member.**

"Now the children and parents will be separated to complete different activities. The children will be enjoy activities led by a member of our study team while the parents will stay here and have a separate lesson."

The tables where the parents sit should be rearranged so they sit as closely as possible 'around' a table or a small space.

****NOTE for TIMING:** Study Staff should limit the child-only activity to <15 minutes ending it before the parents are still in their separate lesson. The study staff should direct the children to start fixing the veggie wraps for both parent and child (2 plates/child) and bring the pre-plated veggie wraps to the table to enjoy after the parents are finished with the strategy session. They can also assist with bringing the ingredients of the wraps to the table(s) so that the meal can be enjoyed family-style.

IV. Discussion of Strategy: Serve vegetables before meals (Nutrition Educator, ~25 min)

1. Survey about last week's strategy: Serve vegetables before meals.

"Last week, I mentioned that this week we would first talk about how you used last week's strategy which was serve at least 2 vegetables with the meal. Before we have a discussion, we are asking you to fill out a short survey about what you did last week. It should only take a few minutes."

At this point, a study staff member will pass out the paper survey and pens and ask parents to complete the survey.

After the parents complete the survey, thank them.

"Thank you for completing the survey, now we will have our discussion. As in all the previous weeks, we are recording our conversation so we don't miss any of your valuable comments about how you used the strategy last week. It works better for us if we record this instead of having an extra person here to take notes. We truly appreciate your contribution and please know it directly impacts the study's results and goals. Because we are recording, please try not to talk while others are talking so the recording is easier to hear."

At this point, a study staff member will start an audio recording.

2. Discussion about last week's strategy: Serve at least 2 vegetables with the meal.

The Nutrition Educator will facilitate the lesson making sure to ask all the questions below. The goal is to encourage feedback about what helped participants use the strategy or what kept participants from using the strategy during the past week. The Nutrition Educator will

go around the table and ask EACH participant the following questions and encourage each participant to give thorough and thoughtful answers:

- **ASK:** How did you use last week's strategy: **Serve at least 2 vegetables with the meal?**
 - **ASK:** What helped you use it?
 - **ASK:** What kept you from using the strategy?

When everyone has had a chance to respond,

ASK: Do you have any other comments to make about serving at least 2 vegetables with the meal?

3. INTRODUCE this week's strategy: Serve vegetables before the meal

*"First, are you enjoying the bowls of vegetables? I just wanted to point this out, because having vegetables before a meal as you're doing right now is the strategy we'll be learning about this week: **SERVE VEGETABLES BEFORE MEALS**. (Show poster and refer to handout.)*

Serving vegetables before a meal will increase the total amount of vegetables consumed. Children may be more likely to eat vegetables offered first because they are hungry and because other foods are not competing for selection."

SAY: Here are some ideas about how to serve vegetables before meals:

- Serve vegetables while dinner is being prepared.
- Serve vegetables 5-10 minutes before dinner is ready.
- Serve a salad before the rest of the meal.
- Use leftovers from a previous day. If your child is hungry before dinner starts, you could warm up these leftover vegetables for them to eat before the rest of the meal.

4. CLARIFY the strategy:

*"Let's make sure that we are all clear about what we asking you to do for this strategy. The vegetables served first can be raw, like we did today. They can also be cooked. If you plan to prepare a cooked vegetable side dish, then cook this dish ahead of the main dish and then go ahead and serve it a few minutes before the start of the meal."
You can put the vegetables you serve first in a separate bowl, as we did here, or you can put them out on the dinner plates where the other foods will be added later."*

"This may work especially well if your children are complaining they are already hungry. You can serve them the cooked vegetable and tell them you're finishing up the rest of the meal, but they can go ahead and eat what is already on their plate -- or on the table."

ASK: What questions do you have about using this strategy?

ASK: What problems do you expect when you use this strategy?

The Nutrition Educator will ask each participant the following question(s) before ending this portion:

- **ASK:** Tomorrow, what vegetable(s) are you going to serve before the meal?
- **ASK:** How are you going to serve it? (Plate? Bowl? Where will they be placed?)

****Nutrition Educator should gently correct if responses do not comply with strategy.**

“Remember, next week we will be asking each one of you how easy or hard it was to use this strategy.”

V. Eating Together (Nutrition Educator, ~20minutes)

1. Try to establish a family-like setting for eating.
2. The Nutrition Educator should sit down and enjoy the meal with participants.
3. While everyone is eating, ask families what they enjoyed about today’s class.

Summarize the key messages from the session:

- Using shopping lists can help you save money.
- Buying vegetables in season and properly storing vegetables can save you money.

4. Pass out groceries and get families excited about next week’s topics and activities.

SESSION SEVEN:
Celebrating Our Success
Upon Arrival:

- Ask families to check in
- Distribute name tags

Overall Goals for Session:

Families will:

- Examine how the previous sessions contributed to enhanced meal planning, shopping and preparation resulting in healthy meals which include vegetables.
- Set goals as a family to continue using acquired skills after the course ends.

Strategy Session Goals:

Parents/caregivers will:

- Describe facilitators and barriers for last week's strategy: Serve vegetables before meals.
- Demonstrate how to correctly use this week's strategy: Use a bigger spoon to serve more vegetables than usual.
- Have a plan for implementing the strategy at a meal the next day.

Objectives

Families will be able to:

- Prepare an entree including a secret vegetable ingredient using cooking skills acquired over the past 5 sessions.
- Roast vegetables to use a new vegetable cooking method
- Recall concepts as a family team regarding MyPlate, meal planning, label reading, vegetables and shopping smart for vegetables.

Recipe(s): Tuna Melt and Roasted Veggies

I. Introduction (Nutrition Educator, ~5 minutes)

***The Nutrition Educator should initiate the session by 5 minutes past the official start time of the session and not wait until all participants have arrived.**

1. Welcome everyone back. **ASK:**Can you share an experience in shopping smart for vegetables—for example by buying in season, on sale, in bulk, in different forms, storing vegetables properly and taking advantages of low cost sources?
 - Introduce today’s lesson format.

“Today’s session is a little different because it is a ‘FUN’ review of the previous lessons. Now remember, it’s NOT the last session. Next week will be similar to the very first session where we had the chef demonstrate and make a meal, and you filled out questionnaires on the iPad and on paper. We’ll be taking the children’s height and weight as well as asking them what they ate the day before. You’ll be able to enjoy different veggie dips and vegetables prepared by our chef!”

Today, we’ll be having a ‘Secret Ingredient’ Cooking Activity as well as review what we’ve learned over this course with a Trivia game. Let’s get started with the cooking demonstration first.”

II. Cooking Demonstration (Chef and Nutrition Educator, ~25 minutes)

****The secret ingredients should be cut/prepared in the hour before the session. These will cut into ‘small diced’ pieces, so they are detectable in the tuna mix, but are not large crunchy pieces.**

During the Cooking demonstration, the classroom assistant and study staff will set up participant preparation stations.

1. **(CHEF)** Introduce the recipes for the day: Tuna Melt and Roasted Veggies. Explain the format of the cooking portion of this class based on the Secret Ingredient Cooking Challenge Activity.
 - a. The participants will be divided into 4 different preparation stations.
 - b. Each of the stations will get a ‘secret’ ingredient to add to their respective tuna mixtures.
 - i. Remember--Don’t peek at the other station’s secret ingredient.
 - ii. More detailed instructions later on in class.
2. CHEF will demonstrate the complete preparation of the Tuna Melt and Roasted Veggie Recipes.

*****The demo should take < 25 minutes.**

- a. *CHEF will not mix in secret ingredient in Tuna Melt during the demo.

- b. When the chef demonstrates how to roast vegetables, he/she should mention which vegetables are best prepared this way, and to briefly review all the other cooking methods he/she has previously demonstrated for vegetables.
3. The Nutrition Educator will stand beside the Chef during the demonstration. The Nutrition Educator should emphasize that today's cooking is an opportunity to review and apply everything learned in previous classes. Point out the steps that families and cooking teams will use to work together in the kitchen, the variety of food groups they will be working with, and kitchen safety steps they should follow.
 - a. Example 1: Mention that the Secret Ingredient challenge demonstrates using the Tuna Melt Recipe as a recipe framework because we will be adding different vegetables in different stations.
 - b. Example 2: You can stock your kitchen with various fresh, canned or frozen vegetables, each has advantages in terms of cost and convenience. Ask if anyone can name an advantage and disadvantage for each form.
 - c. Example 3: How do these recipes fit in MyPlate?
 - d. Example 4: Review knife safety techniques during cutting of veggies.
 - e. Example 5: Tuna is canned so there are low-sodium versions of tuna--like all canned vegetables--there is always a low-sodium version, or vegetables can be rinsed to reduce sodium.
 - f. Example 6: Tuna is a food that may be common at food shelves because it is canned. What vegetables are commonly distributed at food shelves? How can you use these canned vegetables to make your meals more healthy?
4. The Nutrition Educator can stress that adding crunchy vegetables to sandwiches complements the softness of the other ingredients, that roasting vegetables is a way to help children appreciate the variety of cooking methods and how they result in a variety of tastes for children.

Secret Ingredient Cooking Challenge Activity/Participant Preparation of Food (<25 minutes)

1. Have families wash their hands, using proper technique, in preparation for cooking today's recipes.
2. Participants will be divided into 4 groups; each group will consist of 1-2 parent/child pairs
3. The groups will be at stations that are spread out as much as possible so that each 'secret' ingredient will not be easily viewed by other groups.
4. CHEF, Nutrition Educator and KA will walk around assisting participants as needed.
5. A placard with Group # will be displayed at each of the group stations.
6. The 4 secret ingredients are water chestnuts, green pepper, zucchini, and red onion
7. CHEF/Kitchen Assistant (KA) will distribute the prepared secret ingredients in bowls to appropriate groups as follows:
 - BLUE = Water Chestnuts

- GREEN = Green Pepper
- RED = Red Onion
- YELLOW = Zucchini

Each group will:

1. Rinse and dice celery,
2. Rinse, core, and cut tomato into 4 thick slices
3. Rinse lemon and cut in half. In a small bowl, squeeze juice. Discard seeds.
4. Drain tuna in colander.
5. In a medium bowl, add tuna. Flake apart with a fork. Add celery, lemon juice mayonnaise, black pepper, and secret ingredient.
6. While participants are preparing the recipe, CHEF will TOAST slices of bread in oven, 450°F for 10 minutes.
7. After toasting CHEF and KA will distribute toasted slices to each participant.

The participants will...

1. Add ½ cup of the tuna salad mix on the toasted side of each bread slice.
2. Top with tomato slice.
3. Sprinkle with the cheese.

The CHEF and KA will gather all prepared melts as they are being completed, making sure to keep secret ingredient slices together and proceed to finish toasting them in oven. Toast until cheese is melted (~3-5 minutes)

CHEF and KA will prepare each participant's plate. Each plate should have a ¼ sandwich of each of the four secret ingredients, LABELED with a toothpick flag.

Colored toothpicks: assign colors to each secret ingredient--see above

****At this point the Nutrition Educator will initiate a mini-break where the children will be grouped separately from their parents. They will be 'entertained' with an activity (not based on a nutrition topic) led by a study staff member.**

"Now the children and parents will be separated to complete different activities. The children will be enjoy activities led by a member of our study team while the parents will stay here and have a separate lesson."

The tables where the parents sit should be rearranged so they sit as closely as possible 'around' a table or a small space.

*****NOTE FOR TIMING:** Study staff should limit the child-only activity to ~ 10 minutes, ending it while the parents are still in their separate lesson. Use language ab non-nutrition related games

III. Discussion of Behavioral Strategy: Use Bigger Spoon to Serve More Vegetables than Usual (Nutrition Educator, 20 minutes)

***Be sure to have the model of a typical serving spoon AND the bigger spoon.**

1. Survey about last week's strategy: Serve vegetables before the meal

At this point, a study staff member will pass out the paper survey and pens and ask parents to complete the survey.

After the parents complete the survey, thank them.

"Last week, I mentioned that this week we would first talk about how you used last week's strategy which was serve vegetables before the meal. As in all previous weeks, we are recording our conversation so we don't miss any of your comments about how you used the strategy last week. Because we are recording, please try not to talk while others are talking so the recording is easier to hear.

At this point, a study staff member will start an audio recording.

2. Discussion about last week's strategy: Serve vegetables before the meal

The Nutrition Educator will facilitate the lesson making sure to ask all the questions below. The goal is to encourage feedback about what helped participants use the strategy or what kept participants from using the strategy during the past week. The Nutrition Educator will go around the table and ask EACH participant the following questions and encourage each participant to give thorough and thoughtful answers:

- **ASK:** How did you use last week's strategy: Serve vegetables before the meal?
 - **ASK:** What helped you use it?
 - **ASK:** What kept you from using the strategy?

When everyone has had a chance to respond,

- **ASK:** Do you have any other comments to make about serving vegetables before the meal?

3. INTRODUCE this week's strategy: Use bigger spoon to serve more vegetables than usual/

"The final strategy is using a bigger spoon to serve more vegetables. Simple right? We're making it even simpler for you by sending one of these bigger spoons home in your grocery bag tonight."

- Hold up the spoon we will be sending home with them and then hold up a typical-sized serving spoon so they can see the difference (Also use poster and handout of strategy drawing to illustrate the concept). Bring bag of popcorn to demonstrate spoon amount sizes with actual food.

"Here's the spoon we want you to use to serve vegetables. And this is an example of a typical serving spoon you probably already use to serve vegetables."

"We want you to use this spoon every time you serve vegetables to your child. So this means we encourage you to spoon the vegetables out onto your child's plate."

“Now if your children normally serve themselves, put this larger spoon in the vegetable serving dish or container, with no other spoon available so they serve themselves more than they normally would.”

“Also, because you may be serving more than you usually do, you may need to prepare more vegetables--for example, have an extra can of corn, beans, etc ready to open.”

SAY: Here are some vegetables that work well with this strategy:

- Canned Mixed Veggies
- Orange-Glazed Carrots (from Session 4)
- Sautéed Collard Greens (from Session 3)
- Peas/Beans
- Basically Most Steamed or Cooked Veggies

4. CLARIFY the strategy:

“Let’s make sure that we are all clear about what we asking you to do for this strategy. Whenever you serve vegetables or when your child serves him or herself vegetables, we would like you to use the bigger spoon that we provided.”

ASK: What questions do you have about using this strategy?

ASK: What problems do you expect when you use this strategy?

The Nutrition Educator will ask each participant the following question(s) before ending this portion:

- **ASK:** What vegetable or vegetables will you be serving tomorrow where you will use the spoon we provide in your take home grocery bag?
- **ASK:** Will you or your child use the spoon to dish out the vegetables?

****Nutrition Educator should gently correct if responses do not comply with strategy.**

*Remember, next week will be asking each one of you how easy or hard it was to use this strategy and what made it easy or hard. **We will also be practicing this strategy for the meal tonight** by having you and your child use the bigger spoon to serve the roasted vegetables.*

FAQ/Comments that the Nutrition Educator may receive and suggested responses (Do not present these to group, but read through in advance in case they are asked during session):

If your child asks: Why are you giving me more vegetables?

If you find your child notices the increased amount of vegetables and he or she says it’s too much—you can refer to MyPlate and say that the vegetable part of the plate should always have the biggest amount on the plate.

IV. Trivia Game/Course Review (Nutrition Educator, < 25min)

Nutrition Educator will introduce Cooking Matters Trivia Game and serve as 'host.'
 Take envelope off once answered.
 All questions don't have to be asked; stop according to schedule.

	MyPlate	All About Veggies!	Label Reading	Shopping Smart for Veggies	Meal Planning
A	<p>Q:What are the five MyPlate Groups? A: Grains, Veggies, Fruits, Dairy, and Protein</p>	<p>Q: Name three different forms of vegetables you buy in a store? A: Fresh, Frozen, Canned or Dried</p>	<p>Q: Show a sample food label. How much is one serving from this package and how many calories does that provide? A: depends on label</p>	<p>Q: True or False. Buying some foods in bulk like potatoes and onions can save money. A: True.</p>	<p>Q: Name two of the five pieces of the framework for a casserole. A: Protein, vegetable, whole grains, sauce, or toppings.</p>
B	<p>Q:How many food groups should we eat from every day? A: ALL FIVE, Every food group, every day! Try to have at least 4 groups at each meal.</p>	<p>Q: What is the the order of the cost of each type of vegetable, fresh, frozen and canned, from least expensive to most expensive? A: canned (least), frozen , canned (most)</p>	<p>Q: Show a sample veggie label (canned). Is this high in sodium? A: depends on sample label.</p>	<p>Q: Are seasonal fruits and vegetables usually placed in the front or back of the produce section? A: At the front of the section.</p>	<p>Q: What are the benefits of planning a shopping list? A: Save time and money.</p>
C	<p>Q: Give an example of a healthy vs. less healthy choice within the veggie group A: Any appropriate answer</p>	<p>Q: Name a vegetable that's in season in the winter months?</p>	<p>Q: Give an example of a convenience food. Then give an example of how to make it healthier. A: Any answer like: Mac and</p>	<p>Q: True or false.A tomato with mold is safe to eat. A: False, mold can still penetrate below the surface on soft vegetables.</p>	<p>True or False: A framework for a recipe must be followed strictly or else the</p>

			cheese--add greens/ add peas		recipe will be ruined. A: False
D	<p>Q: Why do some of the food groups take up more room on MyPlate than the others?</p> <p>A: To indicate that we should fill our plates with more from those food groups than from the others (ie veggies and fruits!)</p>	<p>Q: What are two ways you might add vegetables to a meal?</p>	<p>Q: What can you do to reduce sodium content in canned vegetables?</p> <p>A: Rinse off with water in colander</p>	<p>Q: What is the cheapest form of vegetables available at the store?</p> <p>A: Canned vegetables.</p>	<p>Q: In Planning a Meal, name two questions that should be answered in your "Plan"</p> <p>A: What foods? When will we prepare this meal? How does this fit into MyPlate? Who will help with each task?</p>
E	<p>Q: For the following meal, place the foods in their appropriate group:</p> <p>Baked Fish Sauteed Greens Fresh Apples Whole Wheat Pasta Glass of 2% Milk</p>	<p>True or False: Tomatoes are best stored in the refrigerator.</p> <p>A: False</p>	<p>Q: What does "DV" stand for on a nutrition label?</p> <p>A: Daily Value</p>	<p>Q: Name one community resource to help buy fresh vegetables.</p> <p>A: Fare for All, EBT card, community gardens/family gardens, farmer's markets,</p>	<p>Q: What are three items that are good to have stocked in your kitchen most if</p>

				discount food stores or food shelves.	not all of the time?
--	--	--	--	---------------------------------------	----------------------

Trivia Game “Rules”

- Teams will be each parent/child pair.
- The Nutrition Educator will ask each family team a question, going around the table until all questions have been answered.
- THE Nutrition Educator will help each family answer correctly and so there will be no winners/losers.

After the trivia game, Nutrition Educator will ask participants if they have any questions that have not yet been answered about eating healthy and working as a family team to share the responsibilities of planning and preparing meals.

Participants will be directed to designated cooking stations.

The participants can be seated while the cheese is being melted.

VI. Eating Together and Secret Ingredient Reveal! (Nutrition Educator, ~20 minutes)

***The large spoons need to be placed in the serving bowls containing the roasted veggies.**

The parent needs to use the larger spoon to serve the Roasted Veggies to children or if the child prefers to help themselves, they need to use the larger spoon.

1. While melts finish cooking, the Nutrition Educator will explain how the secret ingredient challenge reveal will flow.
 - The CHEF and KA will distribute the newly toasted and quartered slices of the first secret ingredient to each of the participants (i.e., 1 quarter of a slice each).
 - The Nutrition Educator will STRESS as the food is being handed out, to NOT EAT until everyone has their plate in front of them.
 - Once participants taste their quarter, the Nutrition Educator will ask who can name the secret ingredient. The only people that can guess are those that did NOT make up that sample.
 - Whoever raises their hand first (and didn’t make up that sample), gets to answer.
 - The next quarters of secret ingredient will be distributed and revealed, and so on until all 4 secret ingredients have been revealed.

Study Staff will remind participants that next week is the very last session of this course AND how payment will work.

“Please don’t’ forget that next week is the last session of this weekly course—it will be very similar to the first session. Each parent will be paid (\$40) for these surveys again AT the session, just like session 1. **Children will not be paid at the session. They will be paid after they**

complete all 3 Food recalls (the food recall survey in person AND the two more food recalls over the phone. After your child finishes the last food recall over the phone, we will arrange a day/time that one of our staff will be here for block of time and you and your child can stop by and pick up your child's payment.

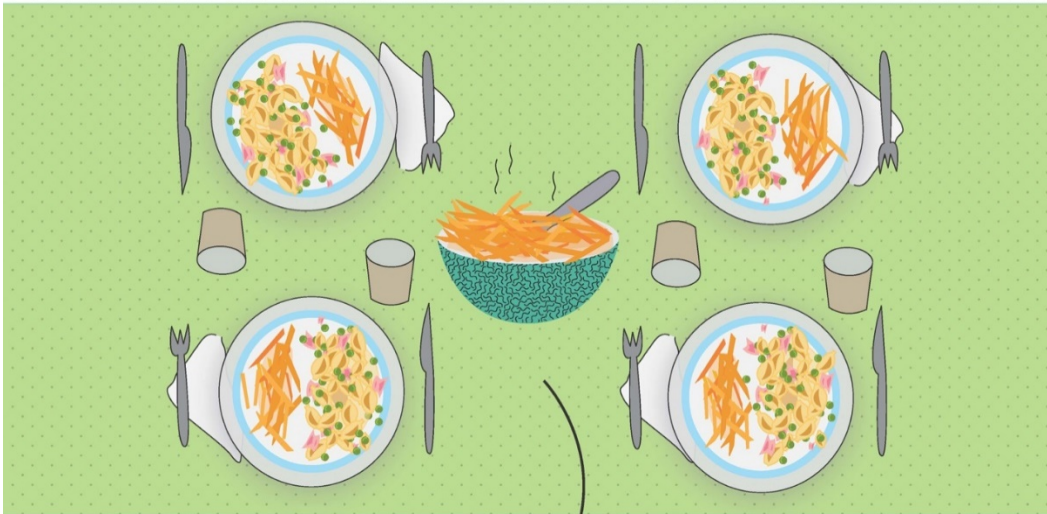
Note to Staff: Make Sure Everyone understands WHEN the child will be paid!!! ASK participants to say when child is paid. This can be done by asking the individual children 'When do you get paid??' You can go around the table to do this.

Appendix 7.19: Behavioral Strategy Posters

Have your child help prepare vegetables for meals

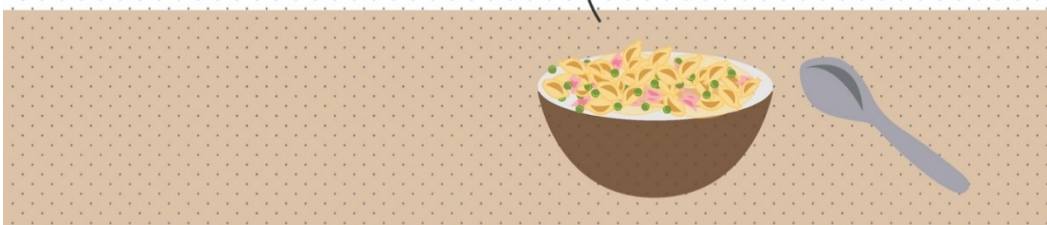


Make vegetables more easily available and visible than other foods at meals



The carrots are on the table for everyone to reach

While the salmon pasta dish is left on the counter

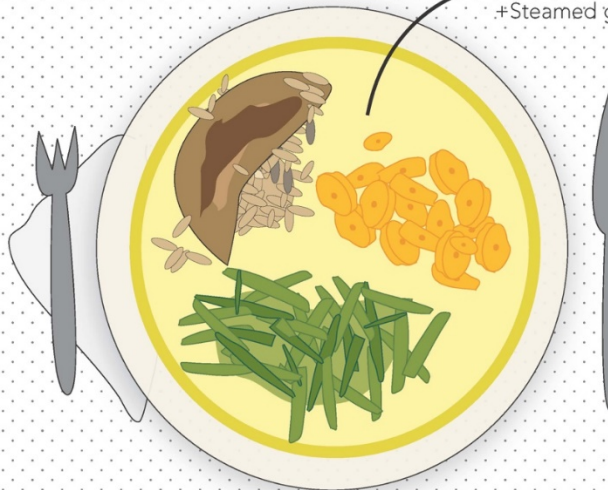


Serve at least two
vegetables with meals

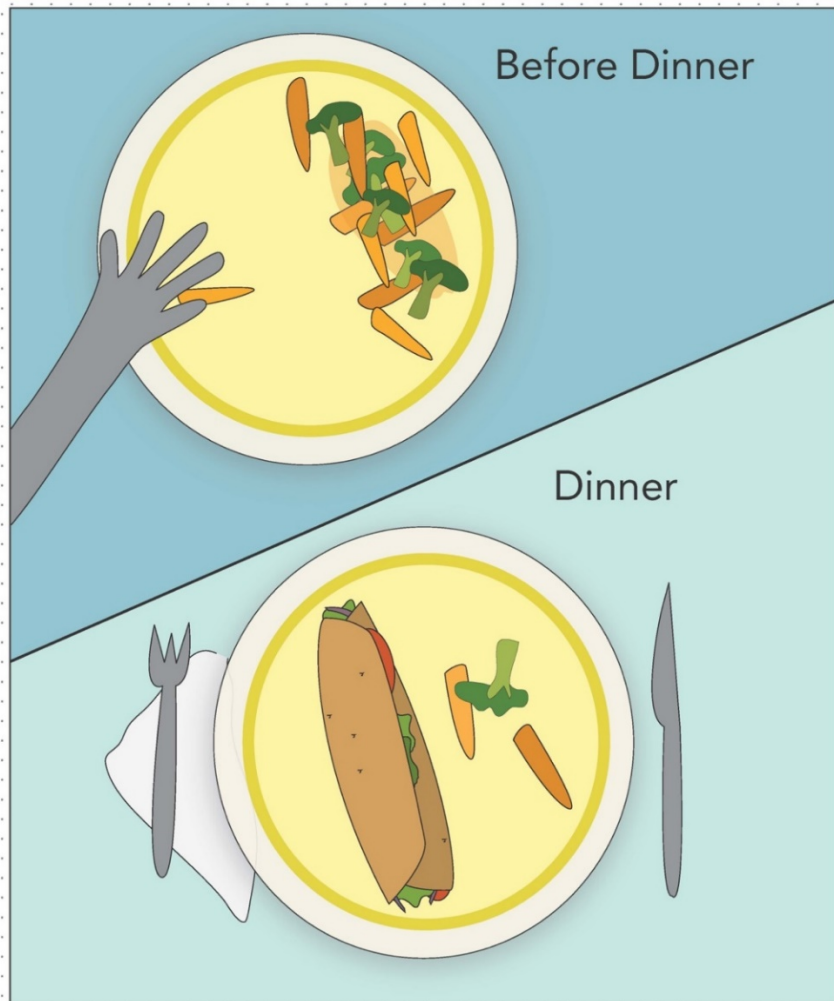


+Rice with mixed veggies
+Steamed green beans

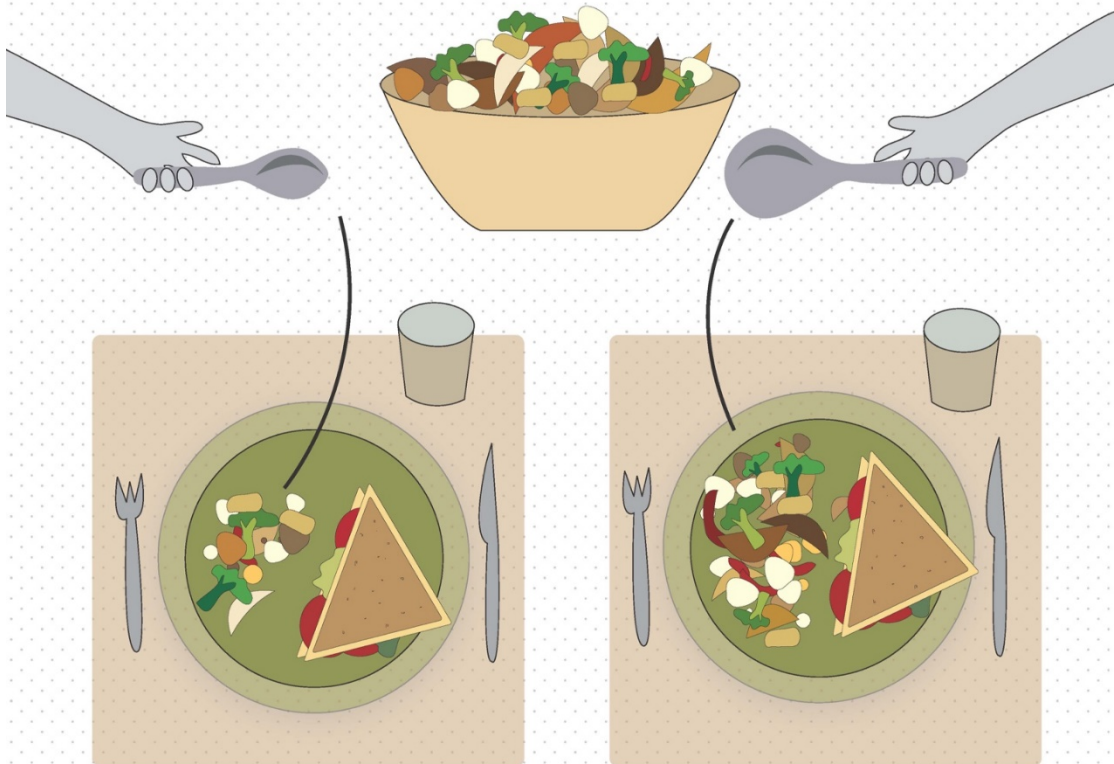
+Chicken and brown rice
+Cooked carrots
+Steamed green beans



Serve vegetables before meals



Use a bigger spoon to serve a larger amount of vegetables with meals



Less vegetables served with the smaller spoon

More vegetables served with the larger spoon

Appendix 7.20: SAS Code

/*Below is the final code in determining final models and thus LSM's for the final tables in the Control vs. INtervention manuscript for the 7 outcome measures:
total vegetable intake and vegetable subgroups,
energy in kcal,
HEI-2010 total score and applicable veg component score),
Child BMIZ,
Mean Child Liking Rating of VEGs,
Mean Number of VEgetables Tried, and
Mean number of Available Vegetables in the home.
The BEST FIT Models are noted within the code.
The code for Table1. Baseline Demographics by Group is found at the end of this program*/

```
libname g "";
```

```
data t;
    set g.ContInterv_ALLVars071217;
run;
```

```
proc format ;
value Group
0="Control"
1="Intervention";
run;
```

```
/*Total VEgetable Intake*/
```

```
/*MODELS!!**MODELS!!**MODELS!!**MODELS!!*/
```

```
proc mixed data=t;
class session course id group;
model totalveg=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model TotalVeg=session group session*group Q1_Child_Sex ;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```

proc mixed data=t;
class session course id group;
model TotalVeg=session group session*group Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model TotalVeg=session group session*group child_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model TotalVeg=session group session*group Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model TotalVeg=session group session*group adult_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model TotalVeg=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*do not include ED if include Energykcal*/

```

```

proc mixed data=t;
class session course id group;
model TotalVeg=session group session*group Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;

```

run;

```
proc mixed data=t;  
class session course id group;  
model TotalVeg=session group session*group FoodSecurity ;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;  
/*more comprehensive models*/
```

```
proc mixed data=t;  
class session course id group;  
model TotalVeg=session group session*group FoodSecurity Energy__kcal_ ;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model TotalVeg=session group session*group FoodSecurity Energy__kcal_ Q3_Education  
Q1_Child_Sex Q2_Child_Age;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
format group group.;  
run; /*BEST fit BEST fit BEST fit BEST fit BEST fit BEST fit BEST fit BEST fit  
*/
```

```
proc mixed data=t;  
class session course id group;  
model TotalVeg=session group session*group FoodSecurity Energy__kcal_ Q3_Education  
Q1_Child_Sex ;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model TotalVeg=session group session*group EnergyDensity Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group session*group/diff;  
run;  
/*TotalNonFriedVeg*/*TotalNonFriedVeg*/*TotalNonFriedVeg*/*TotalNonFriedVeg*/*Tota  
lNonFriedVeg*/*TotalNonFriedVeg*/
```

```
proc univariate data=t;  
var TotalNonFriedVeg ;  
histogram TotalNonFriedVeg;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model TotalNonFriedVeg=session group session*group;  
repeated session/ sub=id(course);  
random id(course);  
lsmeans session group session*group/diff;  
run;/*BASE*/
```

```
proc mixed data=t;  
class session course id group;  
model TotalNonFriedVeg=session group session*group Q1_Child_Sex;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model TotalNonFriedVeg=session group session*group Q2_Child_Age;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model TotalNonFriedVeg=session group session*group child_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model TotalNonFriedVeg=session group session*group Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;
```

```

model TotalNonFriedVeg=session group session*group adult_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model TotalNonFriedVeg=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model TotalNonFriedVeg=session group session*group Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model TotalNonFriedVeg=session group session*group FoodSecurity;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

*/*more comprehensive models*/*

```

proc mixed data=t;
class session course id group;
model TotalNonFriedVeg=session group session*group FoodSecurity Q3_Education
Q1_Child_Sex Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run;/*BEST FIT*//BEST FIT*//BEST FIT*//BEST FIT*/

```

```

proc mixed data=t;
class session course id group;
model TotalNonFriedVeg=session group session*group FoodSecurity Q3_Education adult_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;

```


run;

```
/*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*//*DkGrnVeg*/
```

```
proc mixed data=t;  
class session course id group;  
model DkGrnVeg=session group session*group Q1_Child_Sex Q2_Child_Age;  
repeated session/ sub=id(course);  
random id(course);  
lsmeans session group session*group/diff;  
format group group.;  
run; /*BEST FIT--no comprehensive model necessary b/c base has lowest BIC*/
```

```
proc mixed data=t;  
class session course id group;  
model DkGrnVeg=session group session*group Q1_Child_Sex;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DkGrnVeg=session group session*group Q2_Child_Age;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DkGrnVeg=session group session*group child_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DkGrnVeg=session group session*group Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DkGrnVeg=session group session*group adult_race;
```

```

repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model DkGrnVeg=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model DkGrnVeg=session group session*group Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model DkGrnVeg=session group session*group FoodSecurity;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*DpYellow DpYellow DpYellow
DpYellowDpYellowDpYellowDpYellowDpYellowDpYellowDpYellow DpYellow

```

```

proc mixed data=t;
class session course id group;
model DpYellow=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run; /*BASE*/

```

```

proc mixed data=t;
class session course id group;
model DpYellow=session group session*group Q1_Child_Sex Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST fit--no comprehensive models necessary*/ /*BEST fit--no comprehensive models
necessary*/ /*BEST fit--no comprehensive models necessary*/

```

```
proc mixed data=t;  
class session course id group;  
model DpYellow=session group session*group Q2_Child_Age;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DpYellow=session group session*group child_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DpYellow=session group session*group Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DpYellow=session group session*group adult_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DpYellow=session group session*group Household;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model DpYellow=session group session*group Energy__kcal_;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;
```

```
run;
```

```
proc mixed data=t;  
class session course id group;  
model DpYellow=session group session*group FoodSecurity;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
/*Tomato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*To  
mato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*Tomato*//*
```

```
proc mixed data=t;  
class session course id group;  
model Tomato=session group session*group;  
repeated session/ sub=id(course);  
random id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Tomato=session group session*group Q1_Child_Sex;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Tomato=session group session*group Q2_Child_Age;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Tomato=session group session*group child_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Tomato=session group session*group Q3_Education;  
repeated session/ sub=id(course);
```

```
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model Tomato=session group session*group adult_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model Tomato=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model Tomato=session group session*group Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model Tomato=session group session*group FoodSecurity;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
/*more comprehensive models*/
```

```
proc mixed data=t;
class session course id group;
model Tomato=session group session*group FoodSecurity Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
```

```

model Tomato=session group session*group FoodSecurity Energy__kcal_ adult_race
Q1_Child_Sex Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST FIT BEST FIT BEST FITBEST FITBEST FITBEST FITBEST FITBEST FIT
BEST FIT*/

```

```

proc mixed data=t;
class session course id group;
model Tomato=session group session*group FoodSecurity Energy__kcal_ adult_race
Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;

```

run;

/*do model without adult race but with education jsut to test since similar BIC in single co-var models*/

```

proc mixed data=t;
class session course id group;
model Tomato=session group session*group FoodSecurity Energy__kcal_ Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model Tomato=session group session*group FoodSecurity Energy__kcal_ adult_race Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

/*Legume*/*Legume*/*Legume*/*Legume*/*Legume*/*Legume*/*Legume*/*Legume*/*Legume*/*
Legume/*Legume*/*Legume*/*Legume*/*Legume*/

```

proc mixed data=t;
class session course id group;
model Legume=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run;

```

```
proc mixed data=t;  
class session course id group;  
model Legume=session group session*group Q1_Child_Sex;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Legume=session group session*group Q2_Child_Age;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Legume=session group session*group child_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Legume=session group session*group Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Legume=session group session*group adult_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Legume=session group session*group Household;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```



```

repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST fit**BEST fit**BEST fit**BEST fit**BEST fit**BEST fit**BEST
fit**BEST fit**BEST fit**BEST fit*/

```

```

proc mixed data=t;
class session course id group;
model WhitePotato=session group session*group Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model WhitePotato=session group session*group child_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model WhitePotato=session group session*group Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model WhitePotato=session group session*group adult_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model WhitePotato=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;

```

```

class session course id group;
model WhitePotato=session group session*group Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model WhitePotato=session group session*group FoodSecurity;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

*/*MORE comprehensive modeels */*

```

proc mixed data=t;
class session course id group;
model WhitePotato=session group session*group Q1_Child_Sex Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
/*Energy in kcal**Energy in kcal**Energy in kcal**Energy in kcal**Energy in
/*MODELS!**/*MODELS!**/*MODELS!**/*MODELS!**/

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group/residual;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run; /*BASE*/

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group Q1_Child_Sex;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;

```

```
run;
```

```
proc mixed data=t;  
class session course id group;  
model Energy__kcal_=session group session*group child_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Energy__kcal_=session group session*group Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Energy__kcal_=session group session*group adult_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Energy__kcal_=session group session*group Household;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model Energy__kcal_=session group session*group FoodSecurity;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
/*more comprehensive models*/
```

```
proc mixed data=t;  
class session course id group;  
model Energy__kcal_=session group session*group FoodSecurity Q3_Education;
```

```

repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group FoodSecurity Q3_Education Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group FoodSecurity Q3_Education Q2_Child_Age
adult_race ;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group FoodSecurity Q3_Education Q2_Child_Age
adult_race Q1_Child_Sex ;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group FoodSecurity Q3_Education Q2_Child_Age
adult_race Q1_Child_Sex Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST fit**BEST fit**BEST fit**BEST fit**BEST fit**BEST fit**BEST
fit**BEST fit**BEST fit**BEST fit*/

```

```

proc mixed data=t;
class session course id group;
model Energy__kcal_=session group session*group FoodSecurity Q3_Education Q2_Child_Age
adult_race Q1_Child_Sex Household child_race ;
repeated session/ sub=id(course);

```

```

random course id(course);
lsmeans session group session*group/diff;
run; /*no model output..."WARNING: Stopped because of too many likelihood evaluations " */

/*HEI Total and relevant Component Scores**/*HEI Total and relevant Component
Scores**/*HEI Total and relevant Component Scores**/*HEI Total and relevant Component
Scores**/*HEI Total and relevant Component Scores*/

/*MODELS!!**/*MODELS!!**/*MODELS!!**/*MODELS!!*/
/*TOTAL HEI SCORE!!!!**/*TOTAL HEI SCORE!!!!**/*TOTAL HEI SCORE!!!!*/

/*BASE Model*/
proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group Q1_Child_Sex;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group child_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group Q3_Education;
repeated session/ sub=id(course);

```

```
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group adult_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
/*COMPREHENSIVE models*/*COMPREHENSIVE models*/
/*COMPREHENSIVE models*/*COMPREHENSIVE models*/
```

```
proc mixed data=t;
class session course id group;
model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity Q3_Education  
adult_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity Q3_Education  
adult_race Q1_Child_Sex;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity Q3_Education  
adult_race Q1_Child_Sex child_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity Q3_Education  
adult_race Q1_Child_Sex child_race Energy__kcal_ ;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity Q3_Education  
adult_race Q1_Child_Sex child_race Energy__kcal_ Household ;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;
```

```

model HEI2010_TOTAL_SCORE=session group session*group FoodSecurity Q3_Education
adult_race Q1_Child_Sex child_race Energy__kcal_ Household Q2_Child_Age ;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run;/*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST
FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*/

/*HEI 2010-Total VEg Component score*//*HEI 2010-Total VEg Component score*/
/*BASE Model*/
proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group Q1_Child_Sex;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group child_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group Q3_Education;
repeated session/ sub=id(course);

```



```
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group adult_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group Energy__kcal_;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group FoodSecurity;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
/*more comprehensive models*/
```

```
proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group FoodSecurity Q3_Education
Q1_Child_Sex Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST FIT*/ /*BEST FIT*/ /*BEST FIT*/ /*BEST FIT*/ /*BEST FIT*/
/*BEST FIT*/ /*BEST FIT*/
```

```

proc mixed data=t;
class session course id group;
model HEIX1_TOTALVEG=session group session*group FoodSecurity Q3_Education
Q1_Child_Sex;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*HEIX2_GREEN_AND_BEAN Component score*//*HEIX2_GREEN_AND_BEAN
Component score*//*HEIX2_GREEN_AND_BEAN Component
score*//*HEIX2_GREEN_AND_BEAN Component score*//*HEIX2_GREEN_AND_BEAN
Component score*//*HEIX2_GREEN_AND_BEAN Component score*/

```

```

proc mixed data=t;
class session course id group;
model HEIX2_GREEN_AND_BEAN=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run; /*BASE Model*/

```

```

proc mixed data=t;
class session course id group;
model HEIX2_GREEN_AND_BEAN=session group session*group Q1_Child_Sex;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model HEIX2_GREEN_AND_BEAN=session group session*group Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model HEIX2_GREEN_AND_BEAN=session group session*group child_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```
proc mixed data=t;  
class session course id group;  
model HEIX2_GREEN_AND_BEAN=session group session*group Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEIX2_GREEN_AND_BEAN=session group session*group adult_race;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEIX2_GREEN_AND_BEAN=session group session*group Household;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEIX2_GREEN_AND_BEAN=session group session*group Energy__kcal_;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model HEIX2_GREEN_AND_BEAN=session group session*group FoodSecurity;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
/*more comprehensive models*/
```

```
proc mixed data=t;  
class session course id group;
```

```

model HEIX2_GREEN_AND_BEAN=session group session*group FoodSecurity Q3_Education
Q1_Child_Sex Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST FIT**/*BEST FIT**/*BEST FIT**/*BEST FIT**/*BEST FIT*/

```

```

proc mixed data=t;
class session course id group;
model HEIX2_GREEN_AND_BEAN=session group session*group FoodSecurity Q3_Education
Q1_Child_Sex;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
/*NON-DIETARY OUTCOMES**/*NON-DIETARY OUTCOMES**/*NON-DIETARY
OUTCOMES**/*NON-DIETARY OUTCOMES*/
/*NON-DIETARY OUTCOMES**/*NON-DIETARY OUTCOMES**/*NON-DIETARY
OUTCOMES*/

```

```

/*BMIz BMIzBMIz BMIzBMIz BMIzBMIz BMIzBMIz BMIz BMIz BMIz BMIzBMIz
BMIzBMIz BMIzBMIz

```

```

/*MODELS!!**/*MODELS!!**/*MODELS!!**/*MODELS!!*/

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run; /*BASE*/

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group child_race;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group Q3_Education;
repeated session/ sub=id(course);
random course id(course);

```

```
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model bmiz=session group session*group Household;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model bmiz=session group session*group Energy__kcal_;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model bmiz=session group session*group DaysPhysActive_60min;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model bmiz=session group session*group DaysStrengthenMuscles;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model bmiz=session group session*group AvgHrsTVSchoolDay;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model bmiz=session group session*group AvgHrsComputerGamesSchDay;
```

```

repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group DaysPhysEduClass;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group SportsTeams;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*comprehensive models*//*comprehensive models*//*comprehensive models*/

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group DaysPhysActive_60min Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group DaysPhysActive_60min Household Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST FIT*/ /*BEST FIT*/ /*BEST FIT*/ /*BEST FIT*/ /*BEST FIT*/ /*BEST FIT*/

```

```

proc mixed data=t;
class session course id group;
model bmiz=session group session*group DaysPhysActive_60min Household Q3_Education
AvgHrsTVSchoolDay;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;

```

run;

```
/*CHILD Liking and Child Variety (numtried_child)*/  
/*CHILD Liking and Child Variety (numtried_child)*/  
/*CHILD Liking and Child Variety (numtried_child)*/  
/*MODEL!!*/  
/*MODEL!!*/  
/*MODEL!!*/  
/*MODEL!!*/
```

```
proc mixed data=t;  
class session course id group;  
model AvgLkingScore_Child=session group session*group;  
repeated session/ sub=id(course);  
random id(course);  
lsmeans session group session*group/diff;  
run;/*BASE*/
```

```
proc mixed data=t;  
class session course id group;  
model AvgLkingScore_Child=session group session*group Q3_Education;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model AvgLkingScore_Child=session group session*group Household;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model AvgLkingScore_Child=session group session*group AvgLkingScore_Adult;  
repeated session/ sub=id(course);  
random course id(course);  
lsmeans session group session*group/diff;  
run;
```

```
proc mixed data=t;  
class session course id group;  
model AvgLkingScore_Child=session group session*group NumTried_Adult;
```

```

repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model AvgLkingScore_Child=session group session*group numtried_Child;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model AvgLkingScore_Child=session group session*group NumAvailVeg;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*comprehensive models*//*comprehensive models*//*comprehensive models*/
proc mixed data=t;
class session course id group;
model AvgLkingScore_Child=session group session*group NumAvailVeg Q3_Education
Q1_Child_Sex Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*/

```

```

proc mixed data=t;
class session course id group;
model AvgLkingScore_Child=session group session*group NumAvailVeg Q3_Education
NumTried_Adult;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model AvgLkingScore_Child=session group session*group NumAvailVeg Q3_Education
NumTried_Adult Household;
repeated session/ sub=id(course);

```



```
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
/*Child Variety*/*Child Variety*/*Child Variety*/*Child Variety*/*Child Variety*/*Child
Variety*/*Child Variety*/*Child Variety*/*Child Variety*/*Child Variety*/*
/*
```

```
proc mixed data=t;
class session course id group;
model numtried_child=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group/diff;
run;/*BASE*/
```

```
proc mixed data=t;
class session course id group;
model numtried_child=session group session*group Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model numtried_child=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
model numtried_child=session group session*group AvgLkingScore_Adult;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;
```

```
proc mixed data=t;
class session course id group;
repeated session/ sub=id(course);model numtried_child=session group session*group
NumTried_Adult;
```

```

random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model numtried_Child=session group session*group AvgLkingScore_Child;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model numtried_child=session group session*group NumAvailVeg;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*comprehensive models*/

```

```

proc mixed data=t;
class session course id group;
model numtried_child=session group session*group NumAvailVeg Q3_Education Q1_Child_Sex
Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run; /*BEST Fit*/bEST fit*/BEST Fit*/bEST fit*/BEST Fit*/bEST fit*/BEST
Fit*/bEST fit*/

```

```

proc mixed data=t;
class session course id group;
model numtried_child=session group session*group NumAvailVeg Q3_Education
NumTried_Adult;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*HOME FOOD Inventory*/HOME FOOD Inventory*/HOME FOOD Inventory*/HOME
FOOD Inventory*/HOME FOOD Inventory*/HOME FOOD Inventory*/
/*MODELS!!*/MODELS!!*/MODELS!!*/MODELS!!*/
/*MODELS!!*/MODELS!!*/MODELS!!*/MODELS!!*/
proc mixed data=t;

```

```

class session course id group;
model NumAvailVeg=session group session*group;
repeated session/ sub=id(course);
random id(course);
lsmeans session group session*group session*group/diff;
run; /*BASE*/

```

```

proc mixed data=t;
class session course id group;
model NumAvailVeg=session group session*group Q3_Education;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model NumAvailVeg=session group session*group Household;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model NumAvailVeg=session group session*group AvgLkingScore_Adult;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model NumAvailVeg=session group session*group AvgLkingScore_Child;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

proc mixed data=t;
class session course id group;
model NumAvailVeg=session group session*group NumTried_Adult;
repeated session/ sub=id(course);
random course id(course);

```



```

proc mixed data=t;
class session course id group;
model NumAvailVeg=session group session*group FoodSecurity Q3_Education Household
NumTried_Adult AvgLkingScore_Adult Q1_Child_Sex Q2_Child_Age;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
format group group.;
run;/*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*//*BEST FIT*/

```

```

proc mixed data=t;
class session course id group;
model NumAvailVeg=session group session*group FoodSecurity Q3_Education Household
NumTried_Adult AvgLkingScore_Adult AvgLkingScore_Child;
repeated session/ sub=id(course);
random course id(course);
lsmeans session group session*group/diff;
run;

```

```

/*BASELINE Characteristics*//*BASELINE Characteristics*//*BASELINE Characteristics*/

```

```

/*BASELINE Characteristics*//*BASELINE Characteristics*//*BASELINE Characteristics*/

```

```

proc freq data=t;
tables group*(Q1_Sex age_cat edu_cat adult_race_final Q5_Hispanic Household
FoodSecurity_final
Q1_Child_Sex Q2_Child_Age child_race Q4_Child_Hispanic bmipct_cat)/chisq;
where session=1;
format group group.;
run;

```

```

/*MEANS *//*MEANS *//*MEANS *//*MEANS *//*MEANS *//*MEANS *//*MEANS
*//*MEANS *//*MEANS */
/

```

```

proc sort data=t;
by session;
run;

```

```

proc means data=t;
class group;
by session;
var totalveg TotalNonFriedVeg
DkGrnVeg
DpYellow
Tomato
WhitePotato

```

```

FriedPotato
OthStarchVeg
Legume
OtherVeg
FriedVeg
VegJuice;
format group group.;
run;

```

```

/*AFTER Defense--suggested by L.Harnack--create new diff btw time points variables as
outcomes and compare btw groups*//*AFTER Defense--suggested by L.Harnack--create new diff
btw time points variables as outcomes and compare btw groups*/
/*AFTER Defense--suggested by L.Harnack--create new diff btw time points variables as
outcomes and compare btw groups*//*AFTER Defense--suggested by L.Harnack--create new diff
btw time points variables as outcomes and compare btw groups*/
/*AFTER Defense--suggested by L.Harnack--create new diff btw time points variables as
outcomes and compare btw groups*//*AFTER Defense--suggested by L.Harnack--create new diff
btw time points variables as outcomes and compare btw groups*/
/*AFTER Defense--suggested by L.Harnack--create new diff btw time points variables as
outcomes and compare btw groups*//*AFTER Defense--suggested by L.Harnack--create new diff
btw time points variables as outcomes and compare btw groups*/

```

```

proc contents data=g.AfterDisAnalysis112917 position;
run;

```

```

/*use temp dataset*/
libname d "";

```

```

data aa;
    set d.AfterDisAnalysis112917;
run;

```

```

/*total veg diff btw time points models*/

```

```

proc mixed data=aa;
class group course id /*course id */;
model totalVeg_S2_BL = group FoodSecurity Energy__kcal_ Q3_Education Q1_Child_Sex
Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model totalVeg_S3_BL = group FoodSecurity Energy__kcal_ Q3_Education Q1_Child_Sex
Q2_Child_Age;
lsmeans group;

```

```
format group group.;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model totalVeg_S4_BL = group FoodSecurity Energy__kcal_ Q3_Education Q1_Child_Sex  
Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```
/*non fried veg*/
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model nonfried_S2_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model nonfried_S3_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model nonfried_S4_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```
/*dkgrn*/
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model dkgrn_S2_BL = group Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model dkgrn_S3_BL = group Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```

proc mixed data=aa;
class group course id /*course id */;
model dkgrn_S4_BL = group Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```
/*dp yellow*/
```

```

proc mixed data=aa;
class group course id /*course id */;
model dpyellow_S2_BL = group Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model dpyellow_S3_BL = group Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model dpyellow_S4_BL = group Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```
/*tomato*/
```

```

proc mixed data=aa;
class group course id /*course id */;
model tomato_S2_BL = group FoodSecurity Energy__kcal_ adult_race Q1_Child_Sex
Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model tomato_S3_BL = group FoodSecurity Energy__kcal_ adult_race Q1_Child_Sex
Q2_Child_Age;
lsmeans group;
format group group.;
run;

```



```
proc mixed data=aa;  
class group course id /*course id */;  
model tomato_S4_BL = group FoodSecurity Energy__kcal_ adult_race Q1_Child_Sex  
Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
/*legume*/
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model legume_S2_BL = group FoodSecurity Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model legume_S3_BL = group FoodSecurity Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model legume_S4_BL = group FoodSecurity Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
/*whtpotato*/
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model whtpotato_S2_BL = group Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model whtpotato_S3_BL = group Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;
```

```

class group course id /*course id */;
model whtpotato_S4_BL = group Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

/*hei total*/

```

proc mixed data=aa;
class group course id /*course id */;
model heitotal_S2_BL = group FoodSecurity Q3_Education adult_race Q1_Child_Sex child_race
Energy__kcal_ Household Q2_Child_Age ;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model heitotal_S3_BL = group FoodSecurity Q3_Education adult_race Q1_Child_Sex child_race
Energy__kcal_ Household Q2_Child_Age ;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model heitotal_S4_BL = group FoodSecurity Q3_Education adult_race Q1_Child_Sex child_race
Energy__kcal_ Household Q2_Child_Age ;
lsmeans group;
format group group.;
run;

```

/*hei veg*/

```

proc mixed data=aa;
class group course id /*course id */;
model heiveg_S2_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model heiveg_S3_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model heiveg_S4_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

/*hei bean*/

```

```

proc mixed data=aa;
class group course id /*course id */;
model heibeans_S2_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model heibeans_S3_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model heibeans_S4_BL = group FoodSecurity Q3_Education Q1_Child_Sex Q2_Child_Age;
lsmeans group;
format group group.;
run;

```

```

/*/*child bmiz-need to add in DDaysPhysActive_60min at baseline*/

```

```

proc mixed data=aa;
class group course id /*course id */;
model bmiz_S2_BL = group DaysPhysActive_60min Household Q3_Education;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model bmiz_S3_BL = group DaysPhysActive_60min Household Q3_Education;
lsmeans group;
format group group.;
run;

```

```

proc mixed data=aa;
class group course id /*course id */;
model bmiz_S4_BL = group DaysPhysActive_60min Household Q3_Education;

```

```
lsmeans group;  
format group group. ;  
run;
```

```
/*child liking--nEED to add in NumAvailVeg*/
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model chLike_S2_BL = group NumAvailVeg Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model chLike_S3_BL = group NumAvailVeg Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model chLike_S4_BL = group NumAvailVeg Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
/* ch number tried--nEED to add in NumAvailVeg**/
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model chnumtried_S2_BL = group NumAvailVeg Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model chnumtried_S3_BL = group NumAvailVeg Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group. ;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model chnumtried_S4_BL = group NumAvailVeg Q3_Education Q1_Child_Sex Q2_Child_Age;  
lsmeans group;
```

```
format group group.;  
run;
```

```
/*home avail-- */
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model homeavail_S2_BL = group FoodSecurity Q3_Education Household NumTried_Adult  
AvgLkingScore_Adult Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model homeavail_S3_BL = group FoodSecurity Q3_Education Household NumTried_Adult  
AvgLkingScore_Adult Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```

```
proc mixed data=aa;  
class group course id /*course id */;  
model homeavail_S4_BL = group FoodSecurity Q3_Education Household NumTried_Adult  
AvgLkingScore_Adult Q1_Child_Sex Q2_Child_Age;  
lsmeans group;  
format group group.;  
run;
```